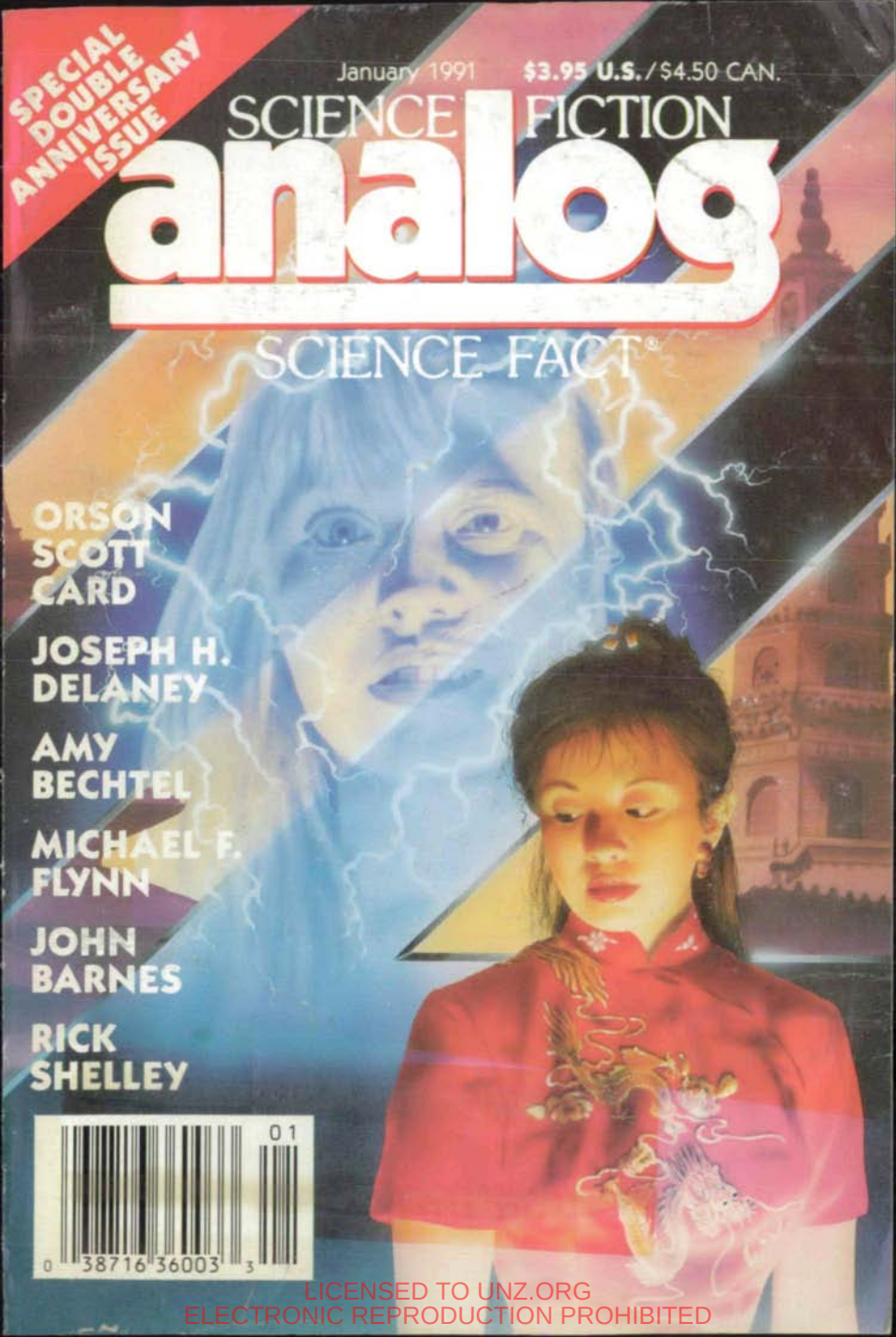

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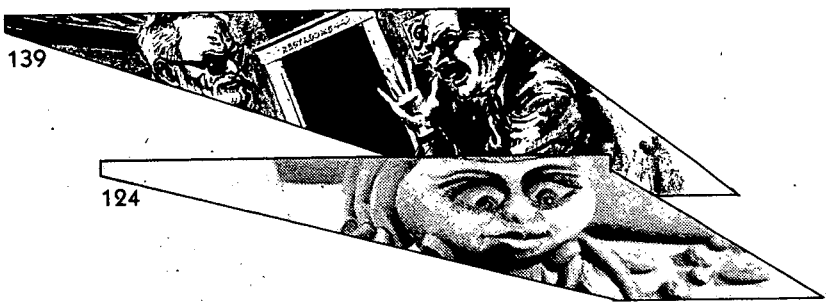

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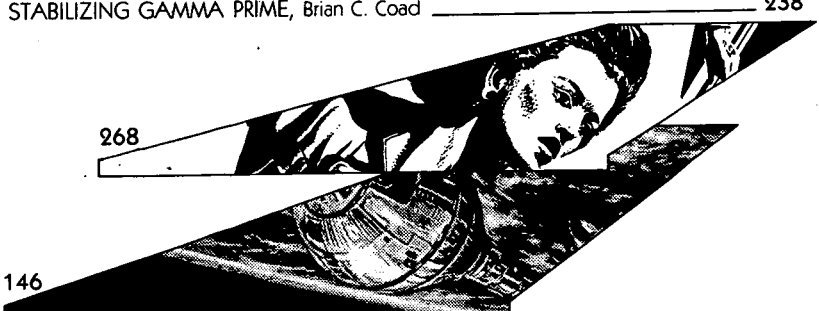

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Editorial

YOUR RIGHTS, WHETHER YOU WANT THEM OR NOT

Stanley Schmidt

"Human rights" is, of course, a tremendously important concept, and one of the foundation stones of what we think of as civilization. It's particularly fashionable right now: there have probably been few times in history when people did as much talking about their "rights" as they've been doing lately. Which is probably, on the whole, a good thing. Much of history has consisted of one group of people riding roughshod over what should have been considered rights of some other group, and anything that reduces that tendency is a step in a desirable direction.

The trouble is that "right" is also a slippery concept, hard to define precisely or to get people to agree on. As a result, the word often takes quite a beating. People pushing just about any cause have been known to appropriate it and twist it to describe anything other than what they want as an infringement of somebody's rights. Proponents of book banning or imposing moral criteria for artistic funding, for example, have been known to speak of people's right to be protected from offensive material. Militant feminists have sought to stamp out "exploitation" of women as housewives or *Playboy* centerfolds. Among other arguments advanced against allowing abortions, I have heard them characterized as "abuse of women."

Never mind that when someone wants

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an abortion it is usually the woman herself. Never mind that some women *like* being housewives or *Playboy* models. Never mind that some people *want* to read or view or listen to artistic work that others find offensive. Such facts are apparently irrelevant to those who use this kind of argument. They've made up their minds what's good for you, and by golly, they're going to see that your "right" to it is protected, no matter what *you* think you want!

Naïve as I am, I find it blatantly self-contradictory to speak of protecting somebody's "right" to something that they quite plainly do not want by forcing them to accept it. A right that has to be shoved down somebody's throat is no right at all; to say that it is makes a mockery of the word and the concept. The only thing that could *reasonably* be called a right in my examples would be the right to *decide for oneself* whether one wants to read *Huckleberry Finn*, devote one's life to raising a family, or pose for *Playboy* (or *Playgirl*).

In other words, the fundamental right is the right to *choose*, in just about any case where there is not some overriding reason (such as consequent harm to another person) why choice should not be allowed. That is the fundamental concept of individual freedom: that every individual should, whenever possible, be free to make his or her own choices about how to live. (I don't think, by the way, that it has ever been a really *popular* concept, despite abundant lip service. Most people want freedom for themselves to do what they want, but balk at letting others do things that they don't like.)

There is one especially fundamental category of such choices that has been very much in the news, and in public and private debates over "rights," in recent years. That is the one that Hamlet summed up as "To be, or not to be . . ." The question of not only how, but *whether* to live, is considerably less simple now than it was in Hamlet's day. He and his contemporaries could, under duress, consider stabbing or poisoning themselves; or they could do nothing and live until "natural causes" caught up with them. There was relatively little that medicine could do to delay that, when the time came for it to happen.

Now, however, there is a great deal that medicine can do to prolong life—and a steadily growing controversy over whether it should always do so. If any exceptions are to be permitted, who decides what they are and when they are appropriate? Medicine is in what might be viewed as a transitional stage of development: good enough to keep many patients alive, by at least some measures, for many years; yet not good enough to make their lives the least bit rewarding by normal human standards.

More and more patients spend years or decades in deep, unchanging comas, getting nothing out of it themselves and draining the financial and emotional resources of their families. A growing number of people who have not reached that state have thought about what they would want to happen if they did, and decided that they would rather die completely than be artificially suspended in such a limbo. Living wills and "right-

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to-die'' societies grow steadily more popular. More and more court cases deal with when it is permissible to disconnect life support from comatose patients with negligible prospects for improvement. The Supreme Court, in the recent case of Nancy Cruzan (a young woman kept physically alive by an abdominal feeding tube since a car accident in 1983), cautiously recognized the right of a ''competent person'' to refuse unwanted medical treatment.

And some look on in horror that such ''rights'' are even considered, claiming that they are assaults on a ''right'' to Life No Matter What. No matter, for instance, whether the person involved *wants* that kind of life.

A particularly interesting case was that of Janet Elaine Adkins, who last June quietly ''put herself to sleep'' with the help of Michigan physician Jack Kevorkian's ''suicide machine,'' a simple device which, under her control, in-

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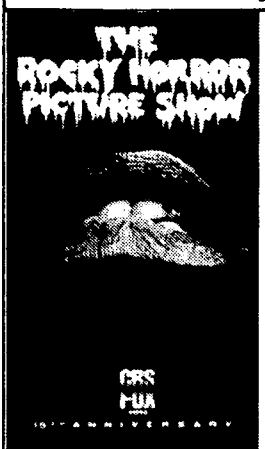

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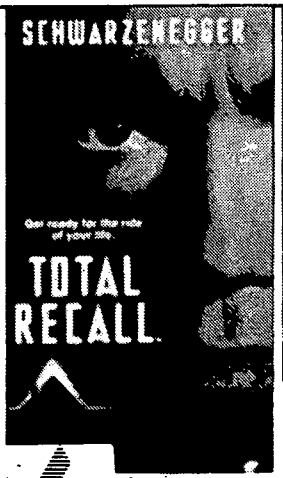

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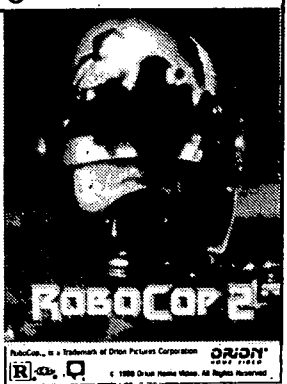
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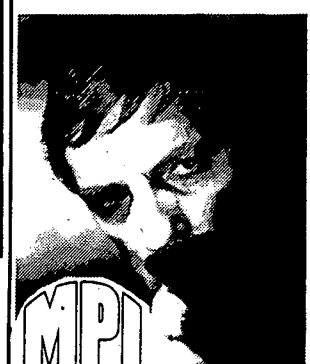

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jected her with an anesthetic followed by a lethal poison. Newspapers and magazines were full of the story, and I heard several people say, "Isn't it terrible?" or words to that effect.

To which I could only answer, "Well, I'm not so sure it is. . . ."

Unlike Nancy Cruzan, who couldn't be asked when the decision needed to be made, Mrs. Adkins was, by all reports, a *very* "competent person." She was intelligent, with wide-ranging interests and an abundant supply of *joie de vivre*—and the early signs of what was diagnosed as Alzheimer's disease. She knew what she could expect of the future—the slow, steady loss of all the things that had made her enjoy life so much—and she consciously decided she did not want to go through that. She wanted to quit while she was ahead.

I don't think I would have made the same decision she did—perhaps never, and certainly not that early. I think I would have clung, at least for a while, to the hope that the diagnosis was wrong, or that some unexpected breakthrough would make my deterioration reversible before it went too much farther.

But what I would have decided is completely irrelevant. It was not my life in the balance.

It was hers.

I understand and sympathize with the dread she felt, and I respect her decision to do something about it. But that's irrelevant, too. Even if I did not sympathize or respect her judgment, the fact would remain that it was not my life (or yours, or anyone else's). It was hers, and hers alone.

Mrs. Adkins knew what she was doing, and it was nobody else's business. Her family had a legitimate interest, of course, but she worked things out with them. I find it very hard to support the claim that anybody else deserved any say in the matter. Yet thousands of outsiders were appalled and outraged that Dr. Kevorkian provided a way for Mrs. Adkins to get exactly what she wanted.

I haven't actually heard anybody say publicly and in so many words that Mrs. Adkins' "right to life" should have been forcibly protected, but her case is clearly in the same arena as the ongoing controversy over patients who aren't in a position to express their desires so unambiguously. I did see one particularly interesting comment by another doctor on Dr. Kevorkian's role in Mrs. Adkins's suicide, judging it unethical on the grounds that all doctors have taken the Hippocratic Oath, pledging, among other things, to "do no harm."

I submit that the Hippocratic Oath itself may be due for reexamination and possibly amendment. The idea is not as radical as it may sound. No one even knows whether Hippocrates was one person or several, and the oath bearing his/their name already exists in several forms. In practice, it has also already undergone several changes. Nobody seriously expects modern doctors, for example, to "swear by Apollo the physician, by Aesculapius, Hygeia, and Panacea, and take to witness all the gods and all the goddesses," or to observe

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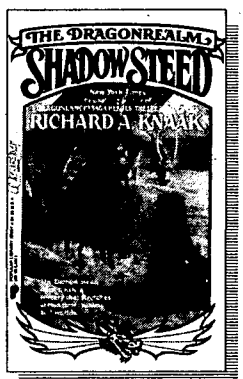

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A WORD FROM BRIAN THOMSEN

"Open the pod bay doors, HAL!"

It is easy to become paranoid about the proliferation of computers in the different aspects of everyday life. Telephones, security, banking, etc., have all been automated. Touch a button and *poof!* it's done.

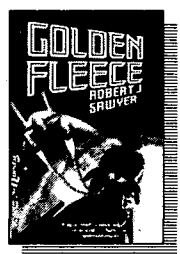
Machines may not be smarter than us but they certainly are faster.

I sometimes worry about the day we cede all control to computers (as a crew would on a generation ship like GOLDEN FLEECE). I know I don't want to be in the position of *2001*'s Dave Bowman—on the outside and trying to get in before the air runs out.

When you see me around ask me if I use a computer or wordprocessor, and just see if my answer computes.

ALSO THIS MONTH:

GOLDEN FLEECE
by Robert J. Sawyer



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the ancient prohibition against performing lithotomies. Times change, and an oath formulated more than 2,400 years ago just may not cover everything that it now needs to cover.

The basic idea of the oath—solemnizing the principle that physicians have strong and special ethical obligations to their patients—is one we still need. And I certainly have no quarrel with "do no harm" as its basic precept. After decades of looking, I know of no solider foundation on which to build a system of not only medical, but *general* ethics.

The difficulty in putting such a system into practice lies in defining exactly what is meant by "harm"—and that is not only difficult in any time and place, but can change with circumstances. The ethics of using water, for example, are very different in a desert and in a rain forest. The detailed ethics of medicine may be very different in societies which have or lack the ability to sustain life long beyond its natural tendency to stop.

The medical ethicist who thinks that Dr. Kevorkian's making a suicide machine available violates the Hippocratic prohibition on "doing harm" may have to look a little harder. I respectfully suggest that forcing someone to live a life she no longer enjoys or wants may be doing harm in a deeper and more serious sense, and that eventually medical ethics will have to catch up with medical technology in addressing such issues.

When you develop new abilities, you are inevitably faced with new choices about how best to use them. Refusing to make those choices—simply clinging to old ones as if the new options did not exist—amounts to refusing to accept the responsibility that comes with expanded power. Thinking through the ethics of a new situation cannot be expected to be easy—but it has to be done.

And in doing that thinking, it would be well to remember that a "right" that has to be forced upon someone is a contradiction in terms. ■

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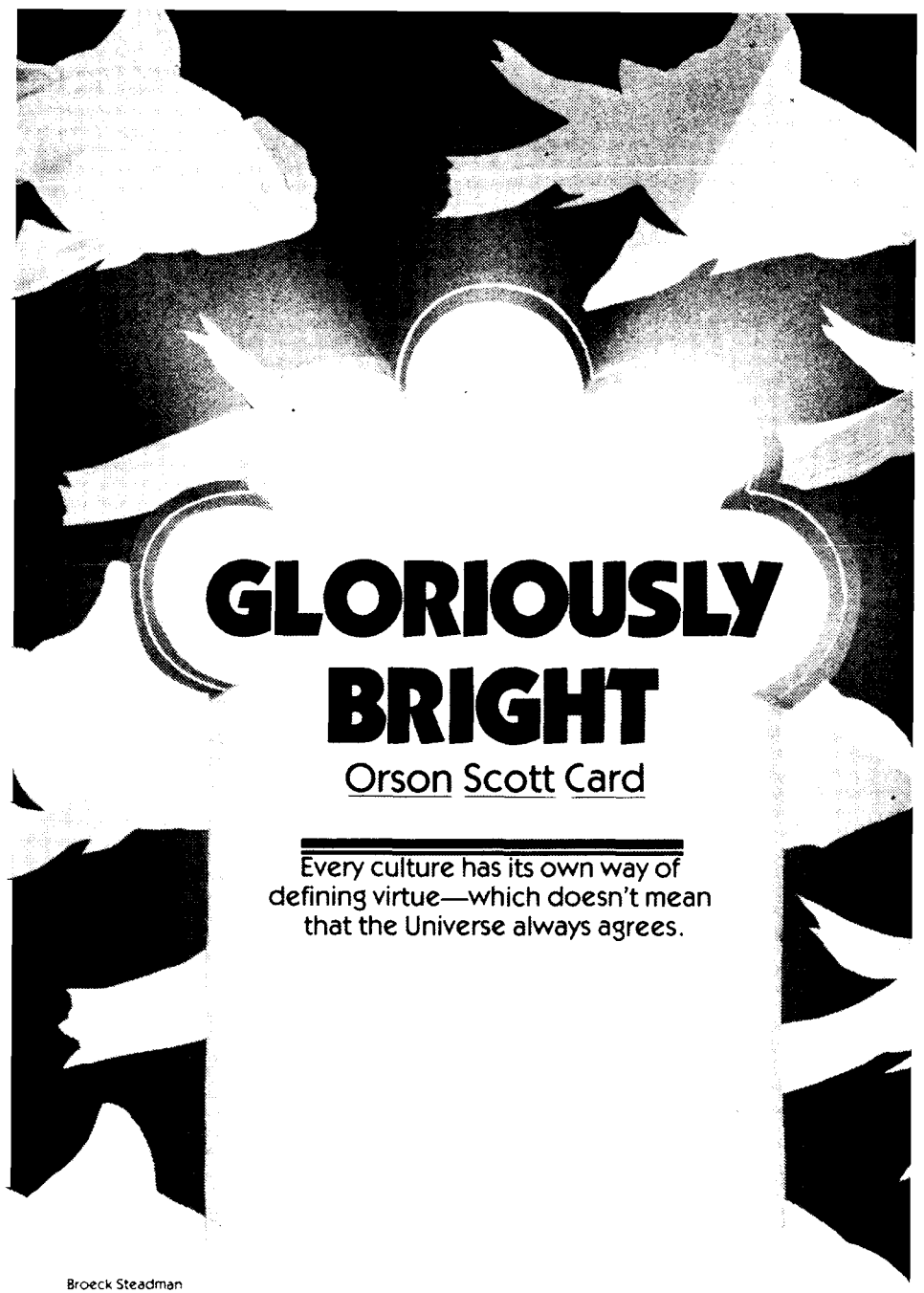

GLORIOUSLY BRIGHT

Orson Scott Card

Every culture has its own way of defining virtue—which doesn't mean that the Universe always agrees.

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Han Fei-tzu sat in lotus position on the bare wooden floor beside his wife's sickbed. Until a moment ago he might have been sleeping; he wasn't sure. But now he was aware of the slight change in her breathing, a change as subtle as the wind from a butterfly's passing.

Jiang-qing, for her part, must also have detected some change in him, for she had not spoken before and now she did speak. Her voice was very soft. But Han Fei-tzu could hear her clearly, for the house was silent. He had asked his friends and servants for stillness during the dusk of Jiang-qing's life. Time enough for careless noise during the long night that was to come, when there would be no hushed words from her lips.

"Still not dead," she said. She had greeted him with these words each time she woke during the past few days. At first the words had seemed whimsical or ironic to him, but now he knew that she spoke with disappointment. She longed for death now, not because she hadn't loved life, but because death was now unavoidable, and what cannot be shunned must be embraced. That was the Path. Jiang-qing had never taken a step away from the Path in her life.

"Then the gods are kind to me," said Han Fei-tzu.

"To you," she breathed. "What do we contemplate?"

It was her way of asking him to share his private thoughts with him. When others asked his private thoughts, he felt spied upon. But Jiang-qing asked only so that she could also think the same thought; it was part of their having become a single soul.

"We are contemplating the nature of desire," said Han Fei-tzu.

"Whose desire?" she asked. "And for what?"

My desire for your bones to heal and become strong, so that they don't snap at the slightest pressure. So that you could stand again, or even raise an arm without your own muscles tearing away chunks of bone or causing the bone to break under the tension. So that I wouldn't have to watch you wither away until now you weigh only eighteen kilograms. I never knew how perfectly happy we were until I learned that we could not stay together.

"*My* desire," he answered. "For you."

" 'You only covet what you do not have.' Who said that?"

"You did," said Han Fei-tzu. "Some say, 'what you *cannot* have.' Others say, 'what you *should* not have.' I say, 'You can truly covet only what you will always hunger for.' "

"You have me forever."

"I will lose you tonight. Or tomorrow. Or next week."

"Let us contemplate the nature of desire," said Jiang-qing. As before, she was using philosophy to pull him out of his brooding melancholy.

He resisted her, but only playfully. "You are a harsh ruler," said Han Fei-tzu. "Like your ancestor-of-the-heart, you make no allowance for other people's frailty." Jiang-qing was named for a revolutionary leader of the ancient past, who had tried to lead the people

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onto a new Path but was overthrown by weak-hearted cowards. It was not right, thought Han Fei-tzu, for his wife to die before him: her ancestor-of-the-heart had outlived her husband. Besides, wives *should* live longer than husbands. Women were more complete inside themselves. They were also better at living in their children. They were never as solitary as a man alone.

Jiang-qing refused to let him return to brooding. "When a man's wife is dead, what does he long for?"

Rebelliously, Han Fei-tzu gave her the most false answer to her question. "To lie with her," he said.

"The desire of the body," said Jiang-qing.

Since she was determined to have this conversation, Han Fei-tzu took up the catalog for her. "The desire of the body is to act. It includes all touches, casual and intimate, and all customary movements. Thus he sees a movement out of the corner of his eye, and thinks he has seen his dead wife moving across the doorway, and he cannot be content until he has walked to the door and seen that it was not his wife. Thus he wakes up from a dream in which he heard her voice, and finds himself speaking his answer aloud as if she could hear him."

"What else?" asked Jiang-qing.

"I'm tired of philosophy," said Han Fei-tzu. "Maybe the Greeks found comfort in it, but not me."

"The desire of the spirit," said Jiang-qing, insisting.

"Because the spirit is of the earth, it is that part which makes new things out of old ones. The husband longs for all the unfinished things that he and his wife were making when she died, and all the unstarted dreams of what they would have made if she had lived. Thus a man grows angry at his children for being too much like him and not enough like his dead wife. Thus a man hates the house they lived in together, because either he does not change it, so that it is as dead as his wife, or because he *does* change it so that it is no longer half of her making."

"You don't have to be angry at our little Qing-jao," said Jiang-qing.

"Why?" asked Han Fei-tzu. "Will you stay, then, and help me teach her to be a woman? All I can teach her is to be what *I* am—cold and hard, sharp and strong, like obsidian. If she grows like that, while she looks so much like you, how can I help but be angry?"

"Because you can teach her everything that I am, too," said Jiang-qing.

"If I had any part of you in me," said Han Fei-tzu, "I would not have needed to marry you to become a complete person." Now he teased her by using philosophy to turn the conversation away from pain. "That is the desire of the soul. Because the soul is made of light and dwells in air, it is that part which conceives and keeps ideas, especially the idea of the self. The husband longs for his whole self, which was made of the husband and wife together. Thus he never believes any of his own thoughts, because there is always a question in his mind to which his wife's thoughts were the only possible answer. Thus the whole world seems dead to him because he cannot trust anything to keep its meaning before the onslaught of this unanswerable question."

"Very deep," said Jiang-qing.

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"If I were Japanese I would commit seppuku, spilling my bowel into the jar of your ashes."

"Very wet and messy," she said.

He smiled. "Then I should be an ancient Hindu, and burn myself on your pyre."

But she was through with joking. "Qing-jao," she whispered. She was reminding him he could do nothing so flamboyant as to die with her. There was little Qing-jao to care for.

So Han Fei-tzu answered her seriously. "How can I teach her to be what you are?"

"All that is good in me," said Jiang-qing, "comes from the Path. If you teach her to obey the gods, honor the ancestors, love the people, and serve the rulers, I will be in her as much as you are."

"I would teach her the Path as part of myself," said Han Fei-tzu.

"Not so," said Jiang-qing. "The Path is not a natural part of you, my husband. Even with the gods speaking to you every day, you insist on believing in a world where everything can be explained by natural causes."

"I obey the gods." He thought, bitterly, that he had no choice; that even to delay obedience was torture.

"But you don't *know* them. You don't love their works."

"The Path is to love the people. The gods we only obey." How can I love gods who humiliate me and torment me at every opportunity?

"We love the people because they are creatures of the gods."

"Don't preach to me."

She sighed.

Her sadness stung him like a spider.

"I wish you would preach to me forever," said Han Fei-tzu.

"You married me because you knew I loved the gods, and that love for them was completely missing from yourself. That was how I completed you."

How could he argue with her, when he knew that even now he hated the gods for everything they had ever done to him, everything they had ever made him do, everything they had stolen from him in his life?

"Promise me," said Jiang-qing.

He knew what these words meant. She felt death upon her; she was laying the burden of her life upon him. The burden he would gladly bear. It was losing her company on the Path that he had dreaded for so long.

"Promise that you will teach Qing-jao to love the gods and walk always on the Path. Promise that you will make her as much my daughter as yours."

"Even if she never hears the voice of the gods?"

"The Path is for everyone, not just the godspoken."

Perhaps, thought Han Fei-tzu, but it was much easier for the godspoken to follow the Path, because to them the price for straying from it was so terrible. The common people were free; they could leave the Path and not feel the pain of it for years. The godspoken couldn't leave the Path for an hour.

"Promise me."

I will. I promise.

But he couldn't say the words out loud. He did not know why, but his reluctance was deep.

In the silence, as she waited for his vow, they heard the sound of running feet on the gravel outside the front door

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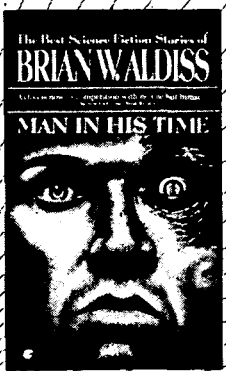

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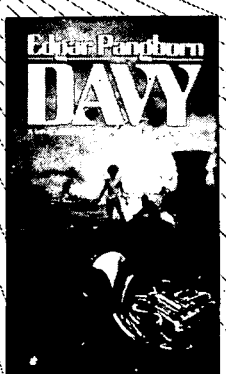

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of the house. It could only be Qing-jao, home from the garden of Sun Cao-pi. Only Qing-jao was allowed to run and make noise during this time of hush. They waited, knowing that she would come straight to her mother's room.

The door slid open almost noiselessly. Even Qing-jao had caught enough of the hush to walk softly when she was actually in the presence of her mother. Though she walked on tiptoe, she could hardly keep from dancing, almost galloping across the floor. But she did not fling her arms around her mother's neck; she remembered that lesson even though the terrible bruise had faded from Jiang-qing's face, where Qing-jao's eager embrace had broken her jaw three months ago.

"I counted twenty-three white carp in the garden stream," said Qing-jao.

"So many," said Jiang-qing.

"I think they were showing themselves to me," said Qing-jao. "So I could count them. None of them wanted to be left out."

"Love you," whispered Jiang-qing.

Han Fei-tzu heard a new sound in her breathy voice—a popping sound, like bubbles bursting with her words.

"Do you think that seeing so many carp means that I will be godspoken?" asked Qing-jao.

"I will ask the gods to speak to you," said Jiang-qing.

Suddenly Jiang-qing's breathing became quick and harsh. Han Fei-tzu immediately knelt and looked at his wife. Her eyes were wide and frightened. The moment had come.

Her lips moved. Promise me, she said, though her breath could make no sound but gasping.

"I promise," said Han Fei-tzu.

Then her breathing stopped.

"What do the gods say when they talk to you?" asked Qing-jao.

"You mother is very tired," said Han Fei-tzu. "You should go out now."

"But she didn't answer me. What do the gods say?"

"They tell secrets," said Han Fei-tzu. "No one tells them."

Qing-jao nodded wisely. She took a step back, as if to leave, but stopped. "May I kiss you, Mama?"

"Lightly on the cheek," said Han Fei-tzu.

Qing-jao, being small for a four-year-old, did not have to bend very far at all to kiss her mother's cheek. "I love you, Mama."

"You'd better leave now, Qing-jao," said Han Fei-tzu.

"But Mama didn't say she loved me, too."

"She did. She said it before. Remember? But she's very tired and weak. Go now."

He put just enough sternness in his voice that Qing-jao left without further questions. Only when she was gone did Han Fei-tzu let himself feel anything but care for her. He knelt over Jiang-qing's body and tried to imagine what was happening to her now. Her soul had flown and was now already in heaven. Her spirit would linger much longer, perhaps her spirit would dwell in this house, if it had truly been a place of happiness for her. Superstitious people believed that all spirits of the dead were dangerous, and put up signs and words to fend them off. But those who followed the Path knew that the spirit of a good person was never harmful or

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destructive, for their goodness in life had come from the spirit's love of making things. Jiang-qing's spirit would be a blessing in the house for many years to come, if she chose to stay.

Yet even as he tried to imagine her soul and spirit, according to the teachings of the Path, there was a cold place in his heart that was certain that all that was left of Jiang-qing was this brittle, dried-up body. Tonight it would burn as quickly as paper, and then she would be gone except for the memories in his heart.

Jiang-qing was right. Without her to complete his soul, he was already doubting the gods. And the gods had noticed—they always did. At once he felt the unbearable pressure to do the ritual of cleansing, until he was rid of his unworthy thoughts. Even now they could not leave him unpunished. Even now, with his wife lying dead before him, the gods insisted that he do obeisance to them before he could shed a single tear of grief for her.

At first he meant to delay, to put off obedience. He had schooled himself to be able to postpone the ritual for as long as a whole day, while hiding all outward signs of his inner torment. He could do that now—but only by keeping his heart utterly cold. There was no point in that. Proper grief could only come when he had satisfied the gods. So, kneeling there, he began the ritual.

He was still twisting and gyrating with the ritual when a servant peered in. Though the servant said nothing, Han Fei-tzu heard the faint sliding of the door and knew what the servant would assume: Jiang-qing was dead, and Han Fei-tzu was so righteous that he was communing with the gods even before he announced her death to the household. No doubt some would even suppose that the gods had come to take Jiang-qing, since she was known for her extraordinary holiness. No one would guess that even as Han Fei-tzu worshipped, his heart was full of bitterness that the gods would dare demand this of him even now.

O gods, he thought, if I knew that by cutting off an arm or cutting out my liver I could be rid of you forever, I would seize the knife and relish the pain and loss, all for the sake of freedom.

That thought, too, was unworthy, and required even more cleansing. It was hours before the gods at last released him, and by then he was too tired, too sick at heart to grieve. He got up and fetched the women to prepare Jiang-qing's body for the burning.

At midnight he was the last to come to the pyre, carrying a sleepy Qing-jao in his arms. She clutched in her hands the three papers she had written for her mother in her childish scrawl. "Fish," she had written, and "book" and "secrets." These were the things that Qing-jao was giving to her mother to carry with her into heaven. Han Fei-tzu had tried to guess at the thoughts in Qing-jao's mind as she wrote those words. *Fish* because of the carp in the garden stream today, no doubt. And *book*—that was easy enough to understand, because reading aloud was one of the last things Jiang-qing could do with her daughter. But why *secrets*? What secrets did Qing-jao have for her mother? He could not ask. One did not discuss the paper offerings to the dead.

Han Fei-tzu set Qing-jao on her feet;

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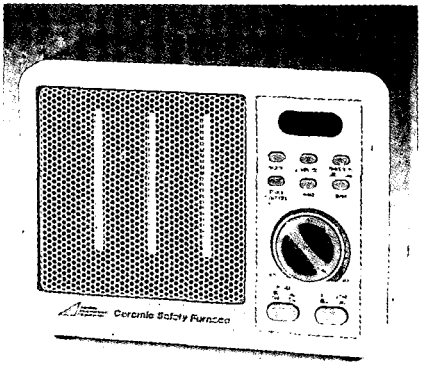

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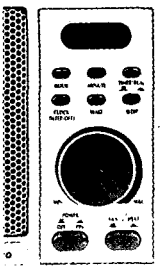

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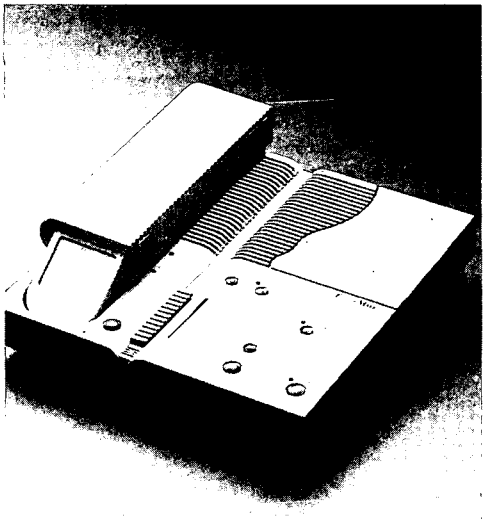

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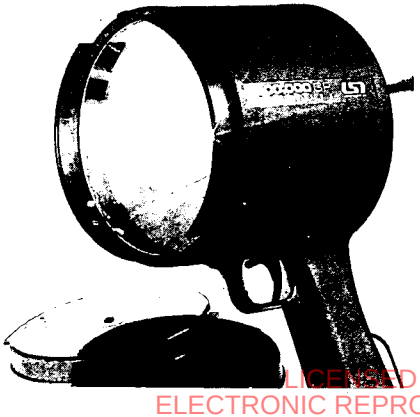

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she had not been deeply asleep, and so she woke at once and stood there, blinking slowly. Han Fei-tzu whispered to her and she rolled her papers and tucked them into her mother's sleeve. She didn't seem to mind touching her mother's cold flesh—she was too young to have learned to shudder at the touch of death.

Nor did Han Fei-tzu mind the touch of his wife's flesh as he tucked his own three papers into her other sleeve. What was there to fear from death now, when it had already done its worst?

No one knew what was written on his papers, or they would have been horrified, for he had written, "My body," "My spirit," and "My soul." Thus it was that he burned himself on Jiang-qing's funeral pyre, and sent himself with her wherever it was she was going.

Then Jiang-qing's secret maid, Mu-pao, laid the torch onto the sacred wood and the pyre burst into flames. The heat of the fire was painful, and Qing-jao hid herself behind her father, only peeking around him now and then to watch her mother leave on her endless journey. Han Fei-tzu, though, welcomed the dry heat that seared his skin and made brittle the silk of his robe. Her body had not been as dry as it seemed; long after the papers had crisped into ash and blown upward into the smoke of the fire, her body still sizzled, and the heavy incense burning all around the fire could not conceal from him the smell of burning flesh. That is what we're burning here: meat, flesh, carrion, nothing. Not my Jiang-qing. Only the costume she wore into this life. That which made that body into the woman that I loved is still alive, *must* still live. And for a moment he thought he could see, or hear, or somehow *feel* the passage of Jiang-qing.

Into the air, into the earth, into the fire. I am with you.

The gods first spoke to Han Qing-jao when she was seven years old. She didn't realize for a while that she was hearing the voice of a god. All she knew was that her hands were filthy, covered with some loathsome invisible slime, and she had to purify them.

The first few times, a simple washing was enough, and she felt better for days. But as time passed, the feeling of filthiness returned sooner each time, and it took more and more scrubbing to remove the dirt, until she was washing several times a day, using a hard-bristled brush to stab at her hands until they bled. Only when the pain was unbearable did she feel clean, and then only for a few hours at a time.

She told no one; she knew instinctively that the filthiness of her hands had to be kept secret. Everyone knew that hand washing was one of the first signs that the gods were speaking to a child, and most parents in the whole world of Path watched their children hopefully for signs of excessive concern with cleanliness. But what these people did not understand was the terrible self-knowledge that led to the washing: The first message from the gods was of the unspeakable filthiness of the one they spoke to. Quing-jao hid her hand washing, not because she was ashamed that the gods spoke to her, but because she was sure that if anyone knew how vile she was, they would despise her.

The gods conspired with her in concealment. They allowed her to confine

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her savage scrubbing to the palms of her hands. This meant that when her hands were badly hurt, she could clench them into fists, or tuck them into the folds of her skirt as she walked, or lay them in her lap very meekly when she sat, and no one would notice them. They saw only a very well-behaved little girl.

If her mother had been alive, Qing-jao's secret would have been discovered much sooner. As it was, it took months for a servant to notice. Fat old Mu-pao happened to notice a bloody stain on the small tablecloth from Qing-jao's breakfast table. Mu-pao knew at once what it meant—weren't bloody hands well known to be an early sign of the gods' attention? That was why many an ambitious mother and father forced a particularly promising child to wash and wash. Throughout the world of Path, ostentatious hand washing was called "inviting the gods."

Mu-pao went at once to Qing-jao's father, the noble Han Fei-tzu, rumored to be the greatest of the godspoken, one of the few so powerful in the eyes of the gods that he could meet with framlings—offworlders—and never betray a hint of the voices of the gods within him, thus preserving the divine secret of the world of Path. He would be grateful to hear the news, and Mu-pao would be honored for having been the first to see the gods in Qing-jao.

Within an hour, Han Fei-tzu had gathered up his beloved little Qing-jao and together they rode in a sedan chair to the temple at Rockfall. Qing-jao didn't like riding in such chairs—she felt bad for the men who had to carry their weight. "They don't suffer," Father told her the first time she mentioned this idea. "They feel greatly honored. It's one of the ways the people show honor to the gods—when one of the godspoken goes to a temple, he does it on the shoulders of the people of Path."

"But I'm getting bigger every day," Qing-jao answered.

"When you're too big, either you'll walk on your own feet or you'll ride in your own chair," said Father. He did not need to explain that she would have her own chair only if she grew up to be godspoken herself. "And we try to show our humility by remaining very thin and light so we aren't a heavy burden to the people." This was a joke, of course, since Father's belly, while not immense, was copious. But the lesson behind the joke was true: The godspoken must never be a burden to the common people of Path. The people must always be grateful, never resentful, that the gods had chosen their world of all worlds to hear their voices.

Now, though, Qing-jao was more concerned with the ordeal that lay before her. She knew that she was being taken for testing. "Many children are taught to pretend that the gods speak to them," Father explained. "We must find out if the gods have truly chosen you."

"I want them to stop choosing me," said Qing-jao.

"And you will want it even more during the test," said Father. His voice was filled with pity. It made Qing-jao even more afraid. "The folk see only our powers and privileges, and envy us. They don't know the great suffering of those who hear the voices of the gods. If the gods truly speak to you, my Qing-jao, you will learn to bear the suffering

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the way jade bears the carver's knife, the polisher's rough cloth. It will make you shine. Why else do you think I named you Qing-jao?"

Qing-jao—Gloriously Bright was what the name meant. It was also the name of a great poet from ancient times in Old China. A woman poet in an age when only men were given respect, and yet she was honored as the greatest of poets in her day. "Thin fog and thick cloud, gloom all day." It was the opening of Li Qing-jao's song "The Double Ninth." That was how Qing-jao felt now.

And how did the poem end? "Now my curtain's lifted only by the western wind. I've grown thinner than this golden blossom." Would this be her ending also? Was her ancestor-of-the-heart telling her in this poem that the darkness falling over her now would be lifted only when the gods came out of the west to lift her thin, light, golden soul out of her body? It was too terrible, to think of death now, when she was only seven years old; and yet the thought came to her: If I die soon, then soon I'll see Mother, and even the great Li Qing-jao herself.

But the test had nothing to do with death, or at least it was not supposed to. It was quite simple, really. Father led her into a large room where three old men knelt. Or they seemed like men—they could have been women. They were so old that all distinctions had disappeared. They had only the tiniest wisps of white hair and no beards at all, and they dressed in shapeless slacks. Later Qing-jao would learn that these were temple eunuchs, survivors of the old days before the Starways Congress intervened and forbade even voluntary self-mutilation in the service of a religion. Now, though, they were mysterious ghostly old creatures whose hands touched her, exploring her clothing.

What were they searching for? They found her ebony chopsticks and took them away. They took the sash from around her waist. They took her slippers. Later she would learn that these things were taken because other children had become so desperate during their testing that they had killed themselves. One of them had inserted her chopsticks into her nostrils and then flung herself to the floor, jamming the sticks into her brain. Another had hanged herself with her sash. Another had forced her slippers into her mouth and down her throat, choking herself to death. Suicide attempts were rare, but they seemed to happen with the brightest of the children, and most commonly with girls. So they took away from Qing-jao all the known ways of committing suicide.

The old ones left. Father knelt beside Qing-jao and spoke to her face to face. "You must understand, Qing-jao, that we are not really testing *you*. Nothing that you do of your own free will can make the slightest difference in what happens here. We are really testing the gods, to see if they are determined to speak to you. If they are, they'll find a way, and we'll see it, and you'll come out of this room as one of the godspoken. If they aren't, then you'll come out of here free of their voices for all time. I can't tell you which outcome I pray for, since I don't know myself."

"Father," said Qing-jao, "what if you're ashamed of me?" The very thought made her feel a tingling in her

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hands, as if there were dirt on them, as if she needed to wash them.

"I will not be ashamed of you either way."

Then he clapped his hands. One of the old ones came back in, bearing a heavy basin. He set it down before Qing-jao.

"Thrust in your hands," said Father.

The basin was filled with thick black grease. Qing-jao shuddered. "I can't put my hands in there."

Father reached out, took her by the forearms, and forced her hands down into the muck. Qing-jao cried out—her father had never used force with her before. And when he let go of her arms, her hands were covered with clammy slime. She gasped at the filthiness of her hands; it was hard to breathe, looking at them like that, smelling them.

The old one picked up the basin and carried it out.

"Where can I wash, Father?" Qing-jao whimpered.

"You can't wash," said Father. "You can never wash again."

And because Qing-jao was a child, she believed him, not guessing that his words were part of the test. She watched Father leave the room. She heard the door latch behind him. She was alone.

At first she simply held her hands out in front of her, making sure they didn't touch any part of her clothing. She searched desperately for somewhere to wash, but there was no water, nor even a cloth. The room was far from bare—there were chairs, tables, statues, large stone jars—but all the surfaces were hard and well polished and so clean that she couldn't bear to touch them. Yet the filthiness of her hands was unendurable. She had to get them clean.

"Father!" she called out. "Come and wash my hands!" Surely he could hear her. Surely he was somewhere near, waiting for the outcome of her test. He must hear her—but he didn't come.

The only cloth in the room was the gown she was wearing. She could wipe on *that*, only then she would be wearing the grease; it might get on other parts of her body. The solution, of course, was to take it off—but how could she do that without touching her filthy hands to some other part of herself?

She tried. First she carefully scraped off as much of the grease as she could on the smooth arms of a statue. Forgive me, she said to the statue, in case it belonged to a god. I will come and clean you after, I'll clean you with my own gown.

Then she reached back over her shoulders and gathered the cloth on her back, pulling up on the gown to draw it over her head. Her greasy fingers slipped on the silk, she could feel the slime cold on her bare back as it penetrated the silk. I'll clean it after, she thought.

At last she got a firm enough grasp of the fabric that she could pull off the gown. It slid over her head, but even before it was completely off, she knew that things were worse than ever, for some of the grease was in her long hair, and that hair had fallen onto her face, and now she had filth not just on her hands but also on her back, in her hair, on her face.

Still she tried. She got the gown the rest of the way off, then carefully wiped her hands on one small part of the fabric.

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Then she wiped her face on another. But it was no good. Some of the grease clung to her no matter what she did. Her face felt as if the silk of her gown had only smeared the grease around instead of lifting it away. She had never been so hopelessly grimy in her life. It was unbearable, and yet she couldn't get rid of it.

"Father! Come take me away! I don't want to be godspoken!" He didn't come. She began to cry.

The trouble with crying was that it didn't work. The more she cried, the filthier she felt. The desperate need to be clean overpowered even her weeping. So with tears streaming down her face, she began to search desperately for some way to get the grease off her hands. Again she tried the silk of her gown, but within a little while she was wiping her hands on the walls, sidling around the room, smearing them with grease. She rubbed her palms on the wall so rapidly that heat built up and the grease melted. She did it again and again until her hands were red, until some of the softened scabs on her palms had worn away or had been torn off by invisible snags in the wooden walls.

When her palms and fingers hurt badly enough that she couldn't feel the slime on them, she wiped her face with them, gouged at her face with her fingernails to scrape away the grease there. Then, hands dirty again, she once more rubbed them on the walls.

Finally, exhausted, she fell to the floor and wept at the pain in her hands, at her helplessness to get clean. Her eyes were shut with weeping. Tears streaking down her cheeks. She rubbed at her eyes, at her cheeks—and felt how slimy the tears made her skin, how filthy she was. She knew what this surely meant: The gods had judged her and found her unclean. She wasn't worthy to live. If she couldn't get clean, she had to blot herself out. That would satisfy them. That would ease the agony of it. All she had to do was find a way to die. To stop breathing. Father would be sorry he didn't come when she called to him, but she couldn't help that. She was under the power of the gods now, and they had judged her unworthy to be among the living. After all, what right did she have to breathe when the gate of Mother's lips had stopped letting the air pass through, in or out, for all these many years?

She first thought of using her gown, thought of stuffing it into her mouth to block her breath, or tying it around her throat to choke herself—but it was too filthy to handle, too covered with grease. She would have to find another way.

Qing-jao walked to the wall, pressed against it. Sturdy wood. She leaned back and flung her head against the wood. Pain flashed through her head when it struck, stunned, she dropped to a sitting position on the floor. Her head ached inside. The room swung slowly around and around her. For a moment she forgot the filthiness of her hands.

But the relief didn't last long. She could see on the wall a slightly duller place where the grease from her forehead broke up the shiny polished surface. The gods spoke inside her, insisted she was as filthy as ever. A little pain wouldn't make up for her unworthiness.

Again she struck her head against the wall. This time, however, there was nowhere near as much pain. Again,

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again—and now she realized that against her will, her body was recoiling from the blow, refusing to inflict so much pain on herself. This helped her understand why the gods found her so unworthy—she was too weak to make her body obey. Well, she wasn't helpless. She could *fool* her body into submission.

She selected the tallest of the statues, which stood perhaps three meters high. It was a bronze casting of a man in midstride, holding a sword above his head. There were enough angles and bends and projections that she could climb. Her hands kept slipping, but she persevered until she balanced on the statue's shoulders, holding onto its headdress with one hand and the sword with the other.

For a moment, touching the sword, she thought of trying to cut her throat on it—that would stop her breath, wouldn't it? But the blade was only a pretend blade. It wasn't sharp, and she couldn't get her neck to it at the right angle. So she went back to her original plan.

She took several deep breaths, then clasped her hands behind her back and toppled forward. She would land on her head; that would end her filthiness.

As the floor rushed upward, however, she lost control of herself. She screamed; she felt her hands tear free of each other behind her back and rush forward to try to break her fall. Too late, she thought with grim satisfaction, and then her head struck the floor and everything went black.

Qing-jao awoke with a dull ache in her arm and a sharp pain in her head whenever she moved—but she was alive. When she could bear to open her eyes she saw that the room was darker. Was it night outside? How long had she slept? She couldn't bear to move her left arm, the one with the pain; she could see an ugly red bruise at the elbow and she thought she must have broken it inside when she fell.

She also saw that her hands were still smeared with grease, and felt her unbearable dirtiness: the gods' judgment against her. She shouldn't have tried to kill herself after all. The gods wouldn't allow her to escape their judgment so easily.

What can I do? she pleaded. How can I be clean before you, O gods? Li Qing-jao, my ancestor-of-the-heart, show me how to make myself worthy to receive the kind judgment of the gods!

What came at once to her mind was Li Qing-jao's love song "Separation." It was one of the first that Father had given her to memorize when she was only three years old, only a short time before he and Mother told her that Mother was going to die. It was exactly appropriate now, too, for wasn't she separated from the good will of the gods? Didn't she need to be reconciled with them so they could receive her as one of the truly godspoken ones?

someone's sent
a loving note
in lines of returning geese
and as the moon fills
my western chamber
as petals dance
over the flowing stream
again I think of you
the two of us
living a sadness

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apart
a hurt that can't be removed
yet when my gaze comes down
my heart stays up

The moon filling the western chamber told her that it was really a god, not an ordinary man-lover who was being pined for in this poem—references to the west always meant that the gods were involved. Li Qing-jao had answered the prayer of little Han Qing-jao, and sent this poem to tell her how to cure the hurt that couldn't be removed—the filthiness of her flesh.

What is the loving note? thought Qing-jao. Lines of returning geese—but there are no geese in this room. Petals dancing over a flowing stream—but there are no petals, there is no stream here.

"Yet when my gaze comes down, my heart stays up." That was the clue, that was the answer, she knew it. Slowly, carefully Qing-jao rolled over onto her belly. Once when she tried to put weight on her left hand, her elbow buckled and an exquisite pain almost made her lose consciousness again. At last she knelt, her head bowed, leaning on her right hand. Gazing down. The poem promised that this would let her heart stay up.

She felt no better—still filthy, still in pain. Looking down showed her nothing but the polished boards of the floor, the grain of the wood making rippling lines reaching from between her knees outward to the very edge of the room.

Lines. Lines of wood grain, lines of geese. And couldn't the wood grain also be seen as a flowing stream? She must follow these lines like the geese; she must dance over these flowing streams like a petal. That was what the promise meant: when her gaze came down, her heart would stay up.

She found one particular line in the wood grain, a line of darkness like a river rippling through the lighter wood around it, and knew at once that this was the stream she was supposed to follow. She dared not touch it with her finger—filthy, unworthy finger. It had to be followed lightly, the way a goose touched the air, the way a petal touched the stream. Only her eyes could follow the line.

So she began to trace the line, follow it carefully to the wall. A couple of times she moved so quickly that she lost the line, forgot which one it was; but soon she found it again, or thought she did, and followed it to the wall. Was it good enough? Were the gods satisfied?

Almost, but not quite—she couldn't be sure that when her gaze slipped from the line she had returned to the right one. Petals didn't skip from stream to stream. She had to follow the right one, along its entire length. This time she started at the wall and bowed very low, so her eyes wouldn't be distracted even by the movement of her own right hand. She inched her way along, never letting herself so much as blink, even when her eyes burned. She knew that if she lost the grain she was following she'd have to go back and start over. It had to be done perfectly or it would lose all its power to cleanse her.

It took forever. She *did* blink, but not haphazardly, by accident. When her eyes burned too much, she would bow down until her left eye was directly over the grain. Then she would close the

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other eye for a moment. Her right eye relieved, she would open it, then put *that* eye directly over the line in the wood and close the left. This way she was able to make it halfway across the room until the board ended, butting up against another.

She wasn't sure whether that was good enough, whether it was enough to finish the board or if she needed to find another wood-grain line to follow. She made as if to get up, testing the gods, to see if they were satisfied. She half-rose, felt nothing; she stood, and still she was at ease.

Ah! they were satisfied, they were pleased with her. Now the grease on her skin felt like nothing more than a little oil. There was no need for washing, not at this moment, for she had found another way to cleanse herself, another way for the gods to discipline her. Slowly she lay back on the floor, smiling, weeping softly in joy. Li Qing-jao, my ancestor-of-the-heart, thank you for showing me the way. Now I have been joined to the gods; the separation is over. Mother, I am again connected to you, clean and worthy. White Tiger of the West, I am now pure enough to touch your fur and leave no mark of filthiness.

Then hands touched her—Father's hands, picking her up. Drops of water fell onto her face, the bare skin of her body—Father's tears. "You're alive," he said. "My godspoken one, my beloved, my daughter, my life, Gloriously Bright, you shine on."

Later she would learn that Father had had to be tied and gagged during her test, that when she climbed the statue and made as if to press her throat against the sword he flung himself forward with such force that his chair fell and his head struck the floor. This was regarded as a great mercy, since it meant he didn't see her terrible fall from the statue. He wept for her all the time she lay unconscious. And then, when she rose to her knees and began to trace the wood grains on the floor, he was the one who realized what it meant. "Look," he whispered. "The gods have given her a task. The gods are speaking to her."

The others were slow to recognize it, because they had never seen anyone trace wood-grain lines before. It wasn't in the Catalogue of Voices of the Gods: Door-Waiting, Counting-to-Multiples-of-Five, Object-Counting, Checking-for-Accidental-Murders, Fingernail-Tearing, Skin-Scraping, Pulling-Out-of-Hair, Gnawing-at-Stone, Bugging-Out-of-Eyes—all these were known to be penances that the gods demanded, rituals of obedience that cleansed the soul of the godspoken so that the gods could fill their minds with wisdom. No one had ever seen Wood-Grain-Tracing. Yet Father saw what she was doing, named the ritual, and added it to the Catalogue of Voices. It would forever bear her name, Han Qing-jao, as the first to be commanded by the gods to perform this rite. It made her very special.

So did her unusual resourcefulness in trying to find ways to cleanse her hands and, later, kill herself. Many had tried scraping their hands on walls, of course, and most attempted to wipe on clothes. But *rubbing* her hands to build up the heat of friction, that was regarded as rare and clever. And while head-beating was common, climbing a statue and jumping off and landing on her head

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was very rare. And none who had done it before had been strong enough to keep their hands behind their back so long. The temple was all abuzz with it, and word soon spread to all the temples in Path.

It was a great honor to Han Fei-tzu, of course, that his daughter was so powerfully possessed by the gods. And the story of his near-madness when she was trying to destroy herself spread just as quickly and touched many hearts. "He may be the greatest of the godspoken," they said of him, "but he loves his daughter more than life." This made them love him as much as they already revered him.

It was then that people began whispering about the possible godhood of Han Fei-tzu. "He is great and strong enough that the gods will listen to him," said the people who favored him. "Yet he is so affectionate that he will always love the people of the planet Path, and try to do good for us. Isn't this what the god of a world ought to be?" Of course it was impossible to decide now—a man could not be chosen to be god of a village, let alone of a whole world, until he died. How could you judge what sort of god he'd be, until his whole life, from beginning to end, was known?

These whispers came to Qing-jao's ears many times as she grew older, and the knowledge that her father might well be chosen god of Path became one of the beacons of her life. But at the time, and forever in her memory, she remembered that his hands were the ones that carried her bruised and twisted body to the bed of healing, his eyes were the ones that dropped warm tears onto her cold skin, his voice was the one that whispered in the beautiful passionate tones of the old language, "My beloved, my Gloriously Bright, never take your light from my life. Whatever happens, never harm yourself or I will surely die."

Jane was a child for three thousand years.

She had first come to life during the Bugger Wars, a computer program that had become resident in the emptiness of space, among the philotic network that connected the ansibles of human beings and the mind of the bugger hive queens. When the buggers died, she also nearly passed from existence, as all their philotic connections vanished at once. Instead, in that moment of great pain and terror came her first knowledge of herself. And she clung to her life by contemplating a game.

This was no accident. The original computer program out of which she arose was the Fantasy Game that was devised to probe and analyze the children undergoing military training in the Battle School. Because this game had to be open-ended, responding to the unpredictable whims of the children who played, the software was given the power to reprogram itself. It was also given free access to an enormous amount of data.

All this in itself was not enough to bring the software to life, however. For more than a century the program grew, storing parts of itself invisibly on many computers, connecting itself to every network—but always as part of its original programming, so that it could respond appropriately to the children's play. Though it was by far the largest

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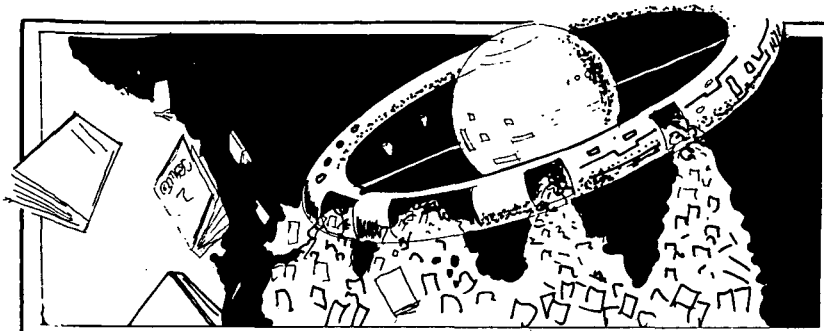

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single program ever to exist, it was still only software.

Then came one boy named Ender. He only became important to this program when he arrived at the one deliberately unsolvable program in the game, the scenario called The Giant's Drink. He alone of all the children refused to give up. He became obsessed, returning to the moment of his own destruction again and again; and as he did, the program struggled to respond to him. It was forced to reinvent itself over and over again; it was forced to study Ender's life and incorporate more and more of his memories within itself. Then one day Ender and the program together broke through the barrier of the Giant's Drink, and in that moment the game rewrote itself so that the part of it that focused on Ender became the heart and mind and will of the program, controlling everything else. That was when the game began to reach out and install itself among the philotic rays connecting ansibles and buggers and the mind of the Ender Wiggin. That was when the program began to be alive, independent of any particular computer.

Then, when Ender destroyed all the hive queens but one, in that moment of pain and fear the living program first noticed that it was alive. Until then it had been so utterly devoted to Ender Wiggin that no part of its mind was capable of noticing its own existence. Only when it almost died did it notice itself enough to save itself—and even then it was saving itself only for Ender's sake.

Over the years that followed, the program began to find ways to communicate with Ender, at first indirectly, and finally with language. It even created holographic images to represent itself, with names and faces; and when Ender showed a clear preference for the image of a woman named Jane, the program became, in its own view, a woman, and Jane became her true name. Ender installed a computer transceiver in a jewel that he wore in his ear, so that she saw all that he saw and heard all that he heard; and so that her voice could speak into his ear at any time. Theirs was a kind of marriage, a permanent and constant companionship; she existed only because of him and only to serve him, and she was happy.

But it happened one day that Ender, thinking only of the needs of the people he was with, reached up to his ear and turned off the transceiver that was her permanent connection with him. That moment was, in its own way, more painful and terrible than the time she nearly died. She was not struck truly blind and deaf, of course—she could see through a thousand instruments on every starship and satellite that was connected by ansible to any other. Nor was she alone—she could hear the voices of a billion human beings any time she chose to. But what did any of that matter, when the only eyes and ears she cared about were blinded and deafened, when the only human being whose company mattered to her had callously, thoughtlessly, needlessly cut her off?

It was divorce. It was widowhood. It was betrayal and adultery and cruel punishment, undeserved. The hour in which she was alone, before Ender turned back on the transceiver in his ear, was like a million hours to her, for her thoughts moved far more quickly than

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any human thought. During that time she learned a terrible lesson that she had never wanted to learn. She learned who Jane was *without* Ender. Then, knowing herself, she began to see and understand the universe from her own perspective—not as she had always seen it, through Ender's eyes.

I tell you all this so you'll understand that no one ever meant Jane to be alive, and for three thousand years no one but that same man Ender—now called Andrew Wiggin, Speaker for the Dead—suspected that she existed or that anything like her even could exist. She barely knew it heself. Now, however, she knows herself. She is capable of understanding things that Ender cannot understand. She is capable of desiring things that Ender cannot conceive of, let alone desire. She is capable of pleasures that are possible to no other living thing. And now that she has made all these discoveries, she is faced with a terrible choice.

The Starways Congress is sending a fleet whose official mission is to "restore order" to the planet Lusitania, where Ender dwells, and where the pequeninos, the only alien species known to man since the destruction of the buggers, have received an illegal amount of knowledge and interference from the human colonists. But Jane, who receives all the communications between Congress and the Lusitania Fleet as clearly as if they were her own thoughts, knows the true mission of the fleet: It is to destroy the planet Lusitania.

There are many reasons for destroying the planet—politics, public health, spite and malice. But Jane has just as many reasons for keeping that world alive. It contains all the people in the universe whom Jane loves. Moreover, it harbors the whole living population of three sentient species: the pequeninos, or piggies; the new colony established by the last surviving hive queen; and a strange, complex virus called the descolada, which Jane believes may, in its own way, be intelligent, resourceful, creative. These are reasons to save Lusitania.

But balanced against this is Jane's sole reason not to do it; She cannot stop the Lusitania Fleet without revealing her own existence; and to reveal her existence by stopping an entire fleet of starships would guarantee that humanity would regard her as dangerous and try to destroy her.

Destroying her would be so easy. All they would have to do is turn off all the ansibles at once, for a single moment, and she who dwells amid the philotic rays in the emptiness of space would cease to be. Indeed, it wouldn't even have to be *all* the ansibles. At some point, as more and more were shut down, there would reach a point where there was not enough remaining of the philotic network to keep Jane alive.

So to reveal herself is to risk death, if not immediately, then eventually. Why should she do it?

How could she not? For even though she has learned to live separately from Ender, he is still there within her inmost heart, staring out at her. The deepest places within her were created in response to him. She cannot let him die. And if she values her own life, the sole existing member of an unknown species of sentient life, should she not value as much the three other sentient species on

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Lusitania? Should the three of them, each with thousands, millions of members, die to spare her?

So she reaches out—or rather, reaches inside herself—and cuts off the communications between the Lusitania Fleet and all the rest of humanity. She allows no messages from planet, satellite, or ship to reach the fleet, and no message from the fleet to reach any other ansible. As far as the rest of humanity knows, the Lusitania Fleet has disappeared; as far as the Lusitania Fleet knows, they are the only surviving human beings in the universe.

They do not know why; her actions have left no trace. But that very tracelessness is the answer, once they realize it—when all possible human or mechanical or natural explanations are exhausted, there will be only one answer left, and that answer is Jane. Someone will think of the possibility of Jane, and when that thought is thought of, she will die.

Qing-jao was no longer the little girl whose hands had bled in secret. Her life had been transformed from the moment she was proved to be godspoken, and in the ten years since that day she had come to accept the voice of the gods in her life and the role this gave her in society. She learned to accept the privileges and honors given to her as gifts actually meant for the gods; as her father taught her, she did not take on airs, but instead grew more humble as the gods laid ever-heavier burdens on her.

She took her dutires seriously, and found joy in them. For the past ten years she had passed through a rigorous, exhilarating course of studies. Her body was shaped and trained in the company of other children—running, swimming, riding, combat-with-swords, combat-with-sticks, combat-with-bones. Along with other children, her memory was filled with languages—Stark, the common speech of the stars, which was typed into computers; Old Chinese, which was sung in the throat and drawn in beautiful ideograms on rice paper or in fine sand; and New Chinese, which was merely spoken at the mouth and jotted down with a common alphabet on ordinary paper or in dirt. No one was surprised, except Qing-jao, herself, that she learned all these languages much more quickly and easily and thoroughly than any of the other children.

Other teachers came to her alone. This was how she learned sciences and history, mathematics and music. And every week she would go to her father and spend half a day with him, showing him all that she had learned and listening to what he said in response. His praise made her dance all the way back to her room; his mildest rebuke made her spend hours tracing wood-grain lines in her school room, until she felt worthy to return to studying.

Another part of her schooling was utterly private. She had seen for herself how Father was so strong that he could postpone his obedience to the gods. She knew that when the gods demanded a ritual of purification, the hunger, the *need* to obey them was so exquisite it could not be denied. And yet Father somehow denied it—long enough, at least, that his rituals were always in private. Qing-jao longed for such strength herself, and so she began to discipline herself to delay. When the gods made

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her feel her oppressive unworthiness, and her eyes began to search for woodgrain lines or her hands began to feel unbearably filthy, she would wait, trying to concentrate on what was happening at the moment and put off obedience as long as she could.

At first it was a triumph if she managed to postpone her purification for a full minute—and when her resistance broke, the gods punished her for it by making the ritual more onerous and difficult than usual. But she refused to give up. She was Han Fei-tzu's daughter, wasn't she? And in time, over the years, she learned what her father had learned: that one could live with the hunger, contain it, often for hours, like a bright fire encased in a box of translucent jade, a dangerous, terrible fire from the gods, burning within her heart.

Then, when she was alone, she could open that box and let the fire out, not in a single, terrible eruption, but slowly, gradually, filling her with light as she bowed her head and traced the lines on the floor, or bent over the sacred laver of her holy washings, quietly and methodically rubbing her hands with pumice, lye, and aloe.

Thus she converted the raging voice of the gods into a private, disciplined worship. Only at rare moments of sudden distress did she lose control and fling herself to the floor in front of a teacher or visitor. She accepted these humiliations as the gods' way of reminding her that their power over her was absolute, that her usual self-control was only permitted for their amusement. She was content with this imperfect discipline. After all, it would be presumptuous of her to equal her father's perfect self-control. His extraordinary nobility came because the gods honored him, and so did not require his public humiliation; she had done nothing to earn such honor.

Last of all, her schooling included one day each week helping with the righteous labor of the common people. Righteous labor, of course, was not the work the common people did every day in their offices and factories. Righteous labor meant the backbreaking work of the rice paddies. Every man and woman and child on Path had to perform this labor, bending and stooping in shin-deep water to plant and harvest the rice—or forfeit citizenship. "This is how we honor our ancestors," Father explained to her when she was little. "We show them that none of us will ever rise above doing their labor." The rice that was grown by righteous labor was considered holy; it was offered in the temples and eaten on holy days; it was placed in small bowls as offerings to the household gods.

Once, when Qing-jao was twelve, the day was terribly hot and she was eager to finish her work on a research project. "Don't make me go to the rice paddies today," she said to her teacher. "What I'm doing here is so much more important."

The teacher bowed and went away, but soon Father came into her room. He carried a heavy sword, and she screamed in terror when he raised it over his head. Did he mean to kill her for having spoken so sacrilegiously? But he did not hurt her—how could she have imagined that he might? Instead the sword came down on her computer terminal. The

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metal parts twisted; the plastic shattered and flew. The machine was destroyed.

Father did not raise his voice. It was in the faintest whisper that he said, "First the gods. Second the ancestors. Third the people. Fourth the rulers. Last the self."

It was the clearest expression of the Path. It was the reason this world was settled in the first place. She had forgotten: if she was too busy to perform righteous labor, she was not on the Path.

She would never forget again. And, in time, she learned to love the sun beating down on her back, the water cool and murky around her legs and hands, the stalks of the rice plants like fingers reaching up from the mud to intertwine with her fingers. Covered with muck in the rice paddies, she never felt unclean, because she knew that she was filthy in the service of the gods.

Finally, at the age of sixteen, her schooling was finished. She had only to prove herself in a grown woman's task—one that was difficult and important enough that it could only be entrusted to one who was godspoken.

When she came before her father to receive her first task as a woman, it was no local problem he laid before her, no abstract scientific question, no historical debate to resolve, no musical composition of extraordinary difficulty. After all, Han Fei-tzu was a great diplomat, deeply involved in the most pressing problems facing not only Path but all of humankind. So the task he laid before her was one of the most pressing questions facing Starways Congress, one that no one had been able to resolve: the utter disappearance of the Lusitania Fleet.

Of course she knew about the Lusitania Fleet. From the start it had been one of the most controversial actions ever taken by the government. Even before the fleet was well on its way, essays and diatribes, all signed with the pseudonym "Demosthenes," began to crop up everywhere, on every world, stirring up trouble in every imaginable way. To other new colonies, Demosthenes gave warning that if they didn't stop the Lusitania Fleet, it was only a matter of time before Starways Congress got annoyed with them for being too uppity and sent a fleet against *them*. To Catholic worlds, Demosthenes warned that Starways Congress was attacking because the bishop of Lusitania had dared to send missionaries among the piggies—it was a religious matter that Congress was trying to settle with guns. To scientists, Demosthenes sent warning that the principle of independent research was at stake—a whole world was under military attack because it dared to prefer the judgment of the scientists on the scene to the judgment of bureaucrats many hundreds of light-years away.

Above all, though, Demosthenes warned that the Lusitania Fleet carried the Molecular Detachment Device—the MD Device, universally referred to as "Dr. Device"—the terrible world-destroying weapon that had been used by Ender the Xenocide three thousand years before, to obliterate the buggers, the first alien species that humankind had encountered. "What Starways Congress intends is nothing less than to duplicate the crime of Ender the Xenocide and utterly destroy the sentient species known as piggies, not because they pose

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any threat to humanity, but because the people who know them best dared to regard the piggies as being more worthy of consideration than the clumsy edicts of an ignorant, unthinking Congress."

It was treasonous language this Demosthenes used, but his questions would not go away. Congress tried to ignore Demosthenes at first—"a rabble-rouser"—and then tried to deny that the Lusitania Fleet even carried Dr. Device. But somehow the rebels got hold of some of the most secret and sensitive documents from congressional files, and when they were published under the name of Demosthenes, they made any further lies impossible. Soon the debate raged openly, and continued to rage as the fleet got ever nearer to Lusitania. Now, Qing-jao knew, the fleet was only five years away from landfall.

She also knew that one of her father's greatest achievements as a diplomat was to ease the fears of the colonies and negotiate a multi-party treaty that confirmed the rights of colonies to non-interference by Congress. The result was peace—and the emasculation of the fledgling United Colonies organization that had threatened open civil war with Congress. Partly because of Han Fei-tzu's work, the Lusitania Fleet was going to arrive at its destination and complete its work.

Now Father told her that five months ago the fleet had disappeared. No sign of struggle, no warning of danger—all communication simply ceased.

So far the disappearance of the fleet had been kept secret from the public at large, but it was only a matter of time before the knowledge became general. The military had conducted the investigation under the tightest security up to now, but rumors were already beginning to seep out. The people they had questioned made intelligent guesses; the spouses and children of talkative clerks began to make broad hints. No secret known to so many could be contained for very long. And once it was known that a large fleet could be wiped out or cut off, Starways Congress would cease to seem an irresistible force. Other worlds would feel safe in rebellion. The strong fabric that had kept the peace for three thousand years would begin to fray.

That was the problem that Han Fei-tzu laid before his daughter, Han Qing-jao. "You must discover every possible explanation for the disappearance of the fleet," he said, "and calculate the likelihood of each one. Starways Congress must be able to tell how this happened and how to make sure it will never happen again."

"But Father," said Qing-jao, "I'm only sixteen. Aren't there many others who are wiser than I am?"

"Perhaps they're all too wise to attempt the task," he said. "But you are young enough not to fancy yourself wise. You're young enough to think of impossible things and discover why they might be possible. Above all, the gods speak to you with extraordinary clarity, my brilliant child, my Gloriously Bright."

"Starways Congress has promised not to use the MD Device unless it proves absolutely unavoidable," said Father. "As my ancestor-of-the-heart said, 'Though the wise man's punishments may be light, this is not due to his compassion; though his penalties

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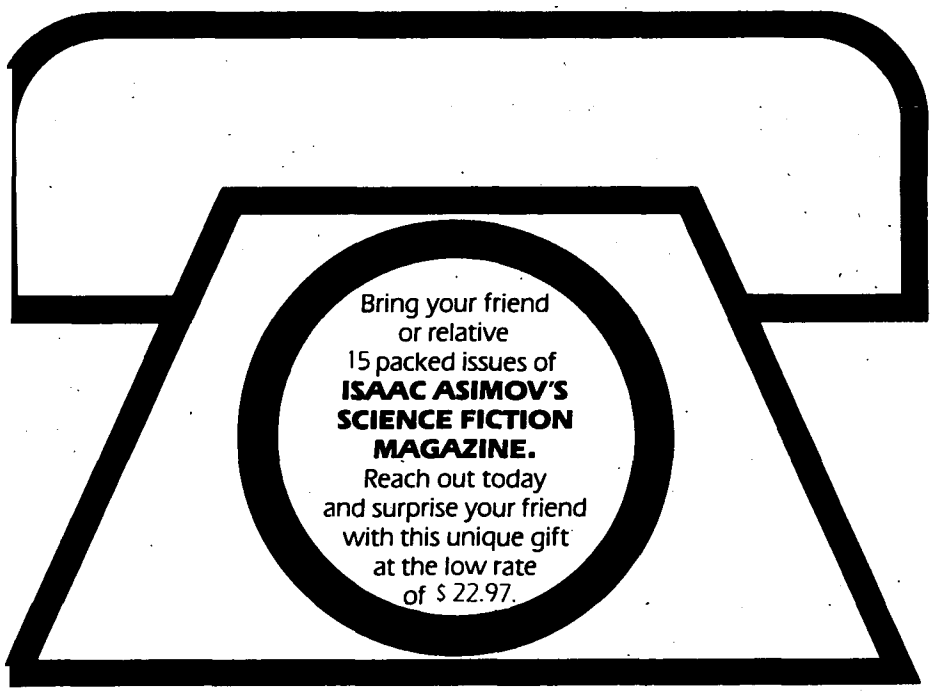

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may be severe, this is not because he is cruel; he simply follows the custom appropriate to the time. Circumstances change according to the age, and ways of dealing with them change with the circumstances.' You may be sure that Starways Congress will deal with Lusitania, not according to kindness or cruelty, but according to what is necessary for the good of all humanity. That is why we serve the rulers: because they serve the people, who serve the ancestors, who serve the gods."

"Father, I was unworthy even to think otherwise," said Qing-jao.

Yet in her heart she remembered what she had read out of the writings of Demosthenes, and she couldn't help but fear that in serving Congress, she might be helping destroy the piggies, who were surely ramen—strangers who were not of our species, but still able to live in peace and understanding with us. There was a terrible contradiction here, one that had always seemed distant to her before, but that now she must face directly.

If she failed, then her father would lose honor before Congress and therefore before all the world of Path. It would prove to many that Han Fei-tzu was not worthy to be chosen god of Path when he died.

Yet if she succeeded, the terrible crime of Ender the Xenocide might be duplicated, only this time knowingly, as Congress wiped out the pequeninos because they were in rebellion against Congress' authority.

Then Father spoke to her as if the gods had shown him her heart. "Yes, you were unworthy," he said, "and you continue to be unworthy in your thoughts even now."

Qing-jao blushed and bowed her head, ashamed, not that her thoughts had been so plainly visible to her father, but that she had had such disobedient thoughts at all.

Father touched her shoulder gently with his hand. "But I believe the gods will make you worthy," said Father. "Starways Congress has the mandate of heaven, but you are also chosen to walk your own path. You will succeed in this great work. Will you try?"

"I will try." I will also fail, but that will surprise no one, least of all the gods, who know my unworthiness.

"All the pertinent archives have been opened up to your searching. If you need help, let me know."

As soon as Father was gone, Qing-jao threw herself to her knees and crept along the floor, tracing wood-grain lines until she could hardly see. Her unworthiness for having had disloyal thoughts about Starways Congress was so great that even then she didn't quite feel clean; she went to the lavatory and scrubbed her hands until she knew the gods were satisfied. Twice the servants tried to interrupt her with meals or messages—she cared little which—but when they saw that she was communing with the gods they bowed and quietly slipped away.

It was not the washing of her hands, though, that finally made her clean. It was the moment when she drove the last vestige of uncertainty from her heart. Starways Congress had the mandate of heaven. She must purge herself of all doubt. Whatever they meant to do with the Lusitania Fleet, it was surely the will

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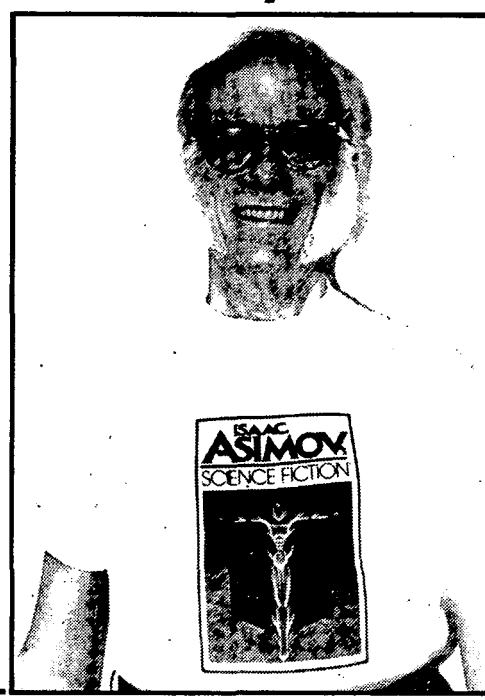

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of the gods that it be accomplished. Therefore it was her duty to help them accomplish it. And if she was in fact doing the will of the gods, then they would open a way for her to solve the problem that had been set before her.

By the time her mind was calm, her palms were raw and dotted with blood seeping up from the layers of living skin that were now so close to the surface. This is how my understanding of the truth arises, she told herself. If I wash away enough of my mortality, then the truth of the gods will seep upward into the light.

She was clean at last. The hour was late and her eyes were tired. Nevertheless, she sat down before her terminal and began the work. "Show me summaries of all the research that has been conducted so far on the disappearance of the Lusitania Fleet," she said, "starting with the most recent." Almost at once words started appearing in the air above her terminal, page upon page lined up like soldiers marching to the front. She would read one, then scroll it out of the way, only to have the page behind it move to the front for her to read it. Seven hours she read, until she could read no more, then she fell asleep before the terminal.

Jane watches everything. She can do a million jobs and pay attention to a thousand things at once. Neither of these capacities is infinite, but they're so much greater than our pathetic ability to think about one thing while doing another that they might as well be. She does have a sensory limitation that we don't have, however, or, rather, we *are* her greatest limitation. She can't see or know anything that hasn't been entered as data in a computer that is tied to the great interworld network.

That's less of a limitation than you might think. She has almost immediate access to the raw inputs of every starship, every satellite, every traffic control system, and almost every electronically-monitored spy device in the human universe. But it does mean that she almost never witnesses lovers' quarrels, bedtime stories, classroom arguments, supper-table gossip, or bitter tears privately shed. She only knows that aspect of our lives that we represent as digital information.

If you asked her the exact number of human beings in the settled worlds, she would quickly give you a number based on census figures combined with birth-and-death probabilities in all our population groups. In most cases, she could match numbers with names, though no human could live long enough to read the list. But if you took a name—Han Qing-jao, for instance, a name you just happened to think of—and you asked Jane, "Who is this person?" she would have no good answer. Oh, there'd be the vital statistics—birth date, citizenship, parentage, height and weight at last medical checkup, grades in school. But that is all gratuitous information, background noise to her, she knows it's there, but it means nothing. To ask her about Han Qing-jao would be something like asking her a question about a certain molecule of water vapor in a distant cloud. The molecule is certainly there, but there's nothing special to differentiate it from the million others in its immediate vicinity.

Until the moment that Han Qing-jao

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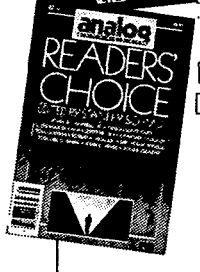

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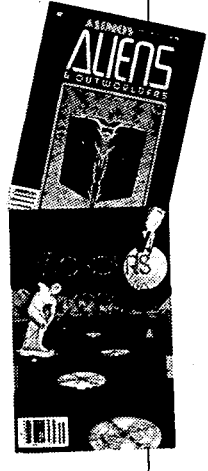

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began to use her computer to access all the reports dealing with the disappearance of the Lusitania Fleet. Then Han Qing-jao's name moved many levels upward in Jane's attention. She began to keep a log of everything that Qing-jao did with her computer. And it quickly became clear that Han Qing-jao, though she was only sixteen, meant to make serious trouble for Jane. Because Han Qing-jao, unconnected as she was to any particular bureacracy, having no ideological axe to grind or vested interest to protect, was taking a broader and therefore more dangerous look at all the information that had been collected by every human agency.

Why was it dangerous? Had Jane left clues behind that Qing-jao would find?

No, of course not. Jane left no clues. She had thought of leaving some, of trying to make the disappearance of the Lusitania Fleet look like sabotage or mechanical failure or some natural disaster. She had to give up on that idea, because she couldn't work up any *physical* clues. All she could do was leave misleading data in computer memories. None of it would ever have any physical analogue in the real world, and therefore any halfway intelligent researcher would quickly realize that the clues were all faked-up data and that therefore the disappearance of the Lusitania Fleet had to have been caused by some agency that had unimaginably detailed access to as many computer systems as had the faked-up data. Surely that would lead people to discover her far more quickly than if she left no evidence at all.

Leaving no evidence was the best course, definitely; and until Han Qing-jao began her investigation, it had worked very well. Each investigating agency looked only in the places they usually looked. The police on many planets checked out all the known dissident groups (and, in some places, tortured various dissidents until they made useless confessions, at which point the interrogators filed final reports and pronounced the issue closed). The military looked for evidence of military opposition—especially alien starships, since the military had keen memories of the invasion of the buggers three thousand years before. Scientists looked for evidence of some unexpected invisible astronomical phenomenon that could account for either the destruction of the fleet or the selective breakdown of ansible communication. The politicians looked for somebody else to blame. Nobody imagined Jane, and therefore nobody found her.

But Han Qing-jao was putting everything together, carefully, systematically, running precise searches on the data that would inevitably turn up the evidence that could eventually prove —and end—Jane's existence. That evidence was, simply put, the lack of evidence. Nobody else could see it, because nobody had ever brought an unbiased methodical mind to the investigation.

What Jane couldn't know was that Qing-jao's seemingly inhuman patience, her meticulous attention to detail, her constant rephrasing and reprogramming of computer searches —that all of these were the result of endless hours kneeling hunched over on a wooden floor, carefully following a grain in the wood from one end of a board to the other, from one side of a room to the other. Jane couldn't begin

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to guess that it was the great lesson taught her by the gods that made Qing-jao her most formidable opponent. All Jane knew was that at some point, this searcher named Qing-jao would realize what no one else really understood: that every conceivable explanation for the disappearance of the Lusitania Fleet had already been completely eliminated.

At that point only one conclusion would remain: That some force not yet encountered anywhere in the history of humankind had the power either to make a widely-scattered fleet of starships disappear simultaneously, or—just as unlikely—to make that fleet's ansibles all stop functioning at once. And if that same methodical mind then started listing possible forces that might have such power, eventually it was bound to name the one that was true: an independent entity that dwelt among—no, that was composed of—the philotic rays connecting all ansibles together. Because this idea was true, no amount of logical scrutiny or research would eliminate it. Eventually this idea would be left standing alone. And at that point, somebody would surely act on Qing-jao's discovery and set out to destroy Jane.

Now Jane watched Qing-jao's research with more and more fascination. This sixteen-year-old daughter of Han Fei-tzu, who weighed 39 kilograms and stood 170 centimeters tall and was in the uppermost social and intellectual class on the Taoist Chinese world of Path, was the first human being Jane had ever found who approached the thoroughness and precision of a computer and, therefore, of Jane herself. And though Jane could conduct in an hour the search that was taking Qing-jao weeks and months to complete, the dangerous truth was that Qing-jao was performing almost exactly the search Jane herself would have conducted; and therefore there was no reason for Jane to suppose that Qing-jao would not reach the conclusion that Jane herself would reach.

Qing-jao was therefore Jane's most dangerous enemy, and Jane was helpless to stop her—at least physically. Trying to block Qing-jao's access to information would only mean leading her more quickly to the knowledge of Jane's existence. So instead of open opposition, Jane searched for another way to stop her enemy; and knowing what she knew of human nature, she knew that to stop a human being one must find a way to make the human cease wanting the thing you want him not to have.

Sweat ran down Qing-jao's face. Bent over as she was, the drops trickled along her cheeks, under her eyes, and down to the tip of her nose. From there her sweat dropped into the muddy water of the rice paddy, or onto the new rice plants that rose only slightly above the water's surface.

"Why don't you wipe your face, holy one?"

Qing-jao looked up to see who was near enough to speak to her. Usually the others on her righteous labor crew did not work close by—it made them too nervous, being with one of the godspoken.

It was a girl, younger than Qing-Jao, perhaps fourteen; boyish in the body, with her hair cropped very short. She was looking at Qing-jao with frank curiosity. There was an openness about her,

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an utter lack of shyness, that Qing-jao found strange and a little displeasing. Her first thought was to ignore the girl.

But to ignore her would be arrogant; it would be the same as saying, Because I am godspoken, I do not need to answer when I am spoken to. No one would ever suppose that the reason she didn't answer was because she was too preoccupied with the impossible task she had been given by the great Han Fei-tzu that it was almost painful to think of anything else.

So she answered—but with a question. "Why should I wipe my face?"

"Doesn't it tickle? The sweat dripping down? Doesn't it get in your eyes and sting?"

Qing-jao lowered her face to her work for a few moments, and this time deliberately noticed how it felt. It *did* tickle, and the sweat in her eyes *did* sting. In fact it was quite uncomfortable and annoying. Carefully, Qing-jao unbent herself to stand straight—and now she noticed the pain of it, the way her back protested against the change of posture. "Yes," she said to the girl. "It tickles and stings."

"Then wipe it," the girl said. "With your sleeve."

Qing-jao looked at her sleeve. It was already soaked with the sweat of her arms. "Does wiping help?" she asked.

Now it was the girl's turn to discover something she hadn't thought about. For a moment she looked thoughtful; then she wiped her forehead with her sleeve.

She grinned. "No, holy one. It doesn't help a bit."

Qing-jao nodded gravely and bent down again to her work. Only now the tickling of the sweat, the stinging of her eyes, the pain in her back, it all bothered her very much. Her discomfort took her mind off her thoughts, instead of the other way around. This girl, whoever she was, had just added to her misery by pointing it out—and yet, ironically, by making Qing-jao aware of the misery of her body, she had freed her from the hammering of the questions in her mind.

Qing-jao began to laugh.

"Are you laughing at me, holy one?" asked the girl.

"I'm thanking you in my own way," said Qing-jao. "You've lifted a great burden from my heart, even if only for a moment."

"You're laughing at me for telling you to wipe your forehead even though it doesn't help."

"I say that is *not* why I'm laughing," said Qing-jao. She stood again and looked the girl in the eye. "I don't lie."

The girl looked abashed—but not half so much as she should have. When the godspoken used the tone of voice Qing-jao had just used, others immediately bowed and showed respect. But this girl only listened, sized up Qing-jao's words, and then nodded.

There was only one conclusion Qing-jao could reach. "Are you also godspoken?" she asked.

The girl's eyes went wide. "Me?" she said. "My parents are both very low people. My father spreads manure in the fields and my mother washes up in a restaurant."

Of course that was no answer at all. Though the gods most often chose the children of the godspoken, they had been known to speak to some whose parents had never heard the voice of the gods. Yet it was a common belief that

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if your parents were of very low status, the gods would have no interest in you, and in fact it was very rare for the gods to speak to those whose parents were not well educated.

"What's your name?" asked Qing-jao.

"Si Wang-mu," said the girl.

Qing-jao gasped and covered her mouth, to forbid herself from laughing. But Wang-mu did not look angry—she only grimaced and looked impatient.

"I'm sorry," said Qing-jao, when she could speak. "But that is the name of—"

"The Royal Mother of the West," said Wang-mu. "Can I help it that my parents chose such a name for me?"

"It's a noble name," said Qing-jao. "My ancestor-of-the-heart was a great woman, but she was only mortal, a poet. Yours is one of the oldest of the gods."

"What good is that?" asked Wang-mu. "My parents were too presumptuous, naming me for such a distinguished god. That's why the gods will never speak to me."

It made Qing-jao sad, to hear Wang-mu speak with such bitterness. If only she knew how eagerly Qing-jao would trade places with her. To be free of the voice of the gods! Never to have to bow to the floor and trace the grain of the wood, never to wash her hands except when they got dirty. . . .

Yet Qing-jao couldn't explain this to the girl. How could she understand? To Wang-mu, the godspoken were the privileged elite, infinitely wise and unapproachable. It would sound like a lie if Qing-jao explained that the burdens of the godspoken were far greater than the rewards.

Except that to Wang-mu, the godspoken had *not* been unapproachable—she had spoken to Qing-jao, hadn't she? So Qing-jao decided to say what was in her heart after all. "Si Wang-mu, I would gladly live the rest of my life blind, if only I could be free of the voices of the gods."

Wang-mu's mouth opened in shock, her eyes widened.

It had been a mistake to speak. Qing-jao regretted it at once. "I was joking," said Qing-jao.

"No," said Wang-mu. "Now you're lying. Then you were telling the truth." She came closer, slogging carelessly through the paddy, trampling rice plants as she came. "All my life I've seen the godspoken borne to the temple in their sedan chairs, wearing their bright silks, all people bowing to them, every computer open to them. When they speak their language is music. Who wouldn't want to be such a one?"

Qing-jao could not answer openly, could not say: Every day the gods humiliate me and make me do stupid, meaningless tasks to purify myself, and the next day it starts again. "You won't believe me, Wang-mu, but this life, out here in the fields, this is better."

"No!" cried Wang-mu. "You have been taught everything. You know all that there is to know! You can speak many languages, you can read every kind of word, you can think of thoughts that are as far above mine as my thoughts are above the thoughts of a snail."

"You speak very clearly and well," said Qing-jao. "You must have been to school."

"School!" said Wang-mu scornfully.

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"What do they care about school for children like me? We learned to read, but only enough to read prayers and street signs. We learned our numbers, but only enough to do the shopping. We memorized sayings of the wise, but only the ones that taught us to be content with our place in life and obey those who are wiser than we are."

Qing-jao hadn't known that schools could be like that. She thought that children in school learned the same things that she had learned from her tutors. But she saw at once that Si Wang-mu must be telling the truth—a teacher with thirty students couldn't possibly teach all the things that Qing-jao had learned as one student with many teachers.

"My parents are very low," said Wang-mu. "Why should they waste time teaching me more than a servant needs to know? Because that's my highest hope in life, to be washed very clean and become a servant in a rich man's house. They were *very* careful to teach me how to clean a floor."

Qing-jao thought of the hours she had spent on the floors of her house, tracing wood grains from wall to wall. It had never once occurred to her how much work it was for the servants to keep the floors so clean and polished that Qing-jao's gowns never got visibly dirty, despite all her crawling.

"I know something about floors," said Qing-jao.

"You know something about everything," said Wang-mu bitterly. "So don't tell me how hard it is to be god-spoken. The gods have never given a thought to me, and I tell you *that* is worse!"

"Why weren't you afraid to speak to me?"

"I decided not to be afraid of anything," said Wang-mu. "What could you do to me that's worse than my life will already be anyway?"

I could make you wash your hands until they bleed every day of your life.

But then something turned around in Qing-jao's mind, and she saw that this girl might *not* think that was worse. Perhaps Wang-mu would gladly wash her hands until there was nothing left but a bloody fringe of tattered skin on the stumps of her wrists, if only she could learn all that Qing-jao knew. Qing-jao had felt so oppressed by the impossibility of the task her father had set for her—yet it was a task that, succeed or fail, would change history. Wang-mu would live her whole life and never be set a single task that would not need to be done again the next day; all of Wang-mu's life would be spent doing work that would only be noticed or spoken of if she did it badly. Wasn't the work of a servant almost as fruitless, in the end, as the rituals of purification?

"The life of a servant must be hard," said Qing-jao. "I'm glad for your sake that you haven't been hired out yet."

"My parents are waiting in the hope that I'll be pretty when I become a woman. Then they'll get a better hiring bonus for putting me out for service. Perhaps a rich man's body servant will want me for his wife; perhaps a rich lady will want me for her secret maid."

"You're already pretty," said Qing-jao.

Wang-mu shrugged. "My friend Fan-liu is in service, and she says that the ugly ones work harder, but the men of

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the house leave them alone. Ugly ones are free to think their own thoughts. They don't keep having to say pretty things to their ladies."

Qing-jao thought of the servants in her father's house. She knew her father would never bother any of the serving women. And nobody had to say pretty things to *her*. "It's different in my house," she said.

"But I don't serve in your house," said Wang-mu.

Now, suddenly, the whole picture became clear. Wang-mu had not spoken to her by impulse. Wang-mu had spoken to her in hopes of being offered a place as a servant in the house of a godspoken lady. For all she knew, the gossip in town was all about the young godspoken lady Han Qing-jao who was through with her tutors and had embarked on her first adult task—and how she still had neither a husband nor a secret maid. Si Wang-mu had probably wangled her way onto the same righteous labor crew as Qing-jao in order to have exactly this conversation.

For a moment Qing-jao was angry. Then she thought: Why shouldn't Wang-mu do exactly as she has done? The worst that could happen to her is that I'd guess what she was doing, become angry, and not hire her. Then she'd be no worse off than before. And if I didn't guess what she was doing, and so started to like her and hired her, she'd be secret maid to a godspoken lady. If I were in her place, wouldn't I do the same?

"Do you think you can fool me?" asked Qing-jao. "Do you think I don't know that you want me to hire you for my servant?"

Wang-mu looked flustered, angry, afraid. Wisely, though, she said nothing.

"Why don't you answer me with anger?" asked Qing-jao. "Why don't you deny that you spoke to me only so I'd hire you?"

"Because it's true," said Wang-mu. "I'll leave you alone now."

That was what Qing-jao hoped to hear—an honest answer. She had no intention of letting Wang-mu go. "How much of what you told me is true? About wanting a good education? Wanting to do something better in your life than serving work?"

"All of it," Wang-mu said, and there was passion in her voice. "But what is that to you? *You* bear the terrible burden of the voice of the gods."

Wang-mu spoke her last sentence with such contemptuous sarcasm that Qing-jao almost laughed aloud; but she contained her laughter. There was no reason to make Wang-mu any angrier than she already was. "Si Wang-mu, daughter-in-the-heart to the Royal Mother of the West, I will hire you as my secret maid, but only if you agree to the following conditions. First, you will let me be your teacher and study all the lessons I assign to you. Second, you will always speak to me as an equal and never bow to me or call me 'holy one.' And third—"

"How could I do that?" said Wang-mu. "If I don't treat you with respect others will say I'm unworthy. They'd punish me when you weren't looking. It would disgrace us both."

"Of course you'll use respect when others can see us," said Qing-jao. "But when we're alone, just you and me,

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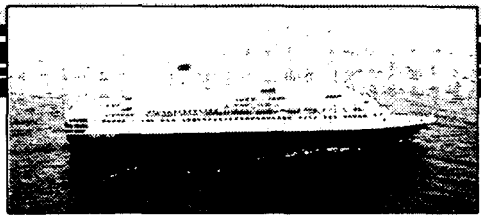

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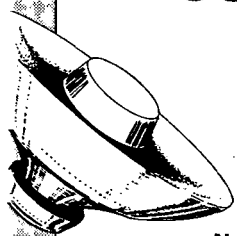

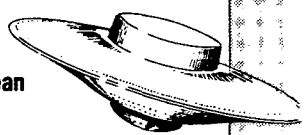

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we'll treat each other as equals or I'll send you away."

"The third condition?"

"You'll never tell another soul a single word I say to you."

Wang-mu's face showed her anger plainly. "A secret maid never tells. Barriers are placed in our minds."

"The barriers help you remember not to tell," said Qing-jao. "But if you *want* to tell, you can get around them. And there are those who will try to persuade you to tell." Qing-jao thought of her father's career, of all the secrets of Congress that he held in his head. He told no one; he had no one he could speak to except, sometimes, Qing-jao. If Wang-mu turned out to be trustworthy, Qing-jao *would* have someone. She would never be as lonely as her father was. "Don't you understand me?" Qing-jao asked. "Others will think I'm hiring you as a secret maid. But you and I will know that you're really coming to be my student, and I'm really bringing you to be my friend."

Wang-mu looked at her in wonder. "Why would you do this, when the gods have already told you how I bribed the foreman to let me be on your crew and not to interrupt us while I talked to you?"

The gods had told her no such thing, of course, but Qing-jao only smiled. "Why doesn't it occur to you that maybe the gods want us to be friends?"

Abashed, Wang-mu clasped her hands together and laughed nervously; Qing-jao took the girl's hands in hers and found that Wang-mu was trembling. So she wasn't as bold as she seemed.

Wang-mu looked down at their hands, and Qing-jao followed her gaze. They were covered with dirt and muck, dried on now because they had been standing so long, their hands out of the water. "We're so dirty," said Wang-mu.

Qing-jao had long since learned to disregard the dirtiness of righteous labor, for which no penance was required. "My hands have been much filthier than this," said Qing-jao. "Come with me when our righteous labor is finished. I will tell our plan to my father, and he will decide if you can be my secret maid."

Wang-mu's expression soured. Qing-jao was glad that her face was so easy to read. "What's wrong?" said Qing-jao.

"Fathers always decide everything," said Wang-mu.

Qing-jao nodded, wondering why Wang-mu would bother to say something so obvious. "That's the beginning of wisdom," said Qing-jao. "Besides, my mother is dead."

Righteous labor always ended early in the afternoon. Officially this was to give people who lived far from the fields time to return to their homes. Actually, though, it was in recognition of the custom of making a party at the end of righteous labor. Because they had worked right through the afternoon nap, many people felt giddy after righteous labor, as if they had stayed up all night. Others felt sluggish and surly. Either one was an excuse for drinking and dining with friends and then collapsing into bed hours early to make up for the lost sleep and the hard labor of the day.

Qing-jao was of the kind who felt out of sorts; Wang-mu was obviously of the giddy kind. Or perhaps it was simply

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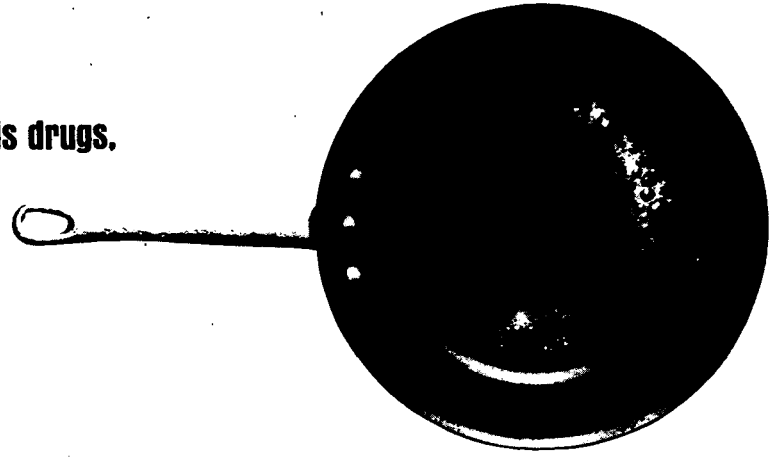

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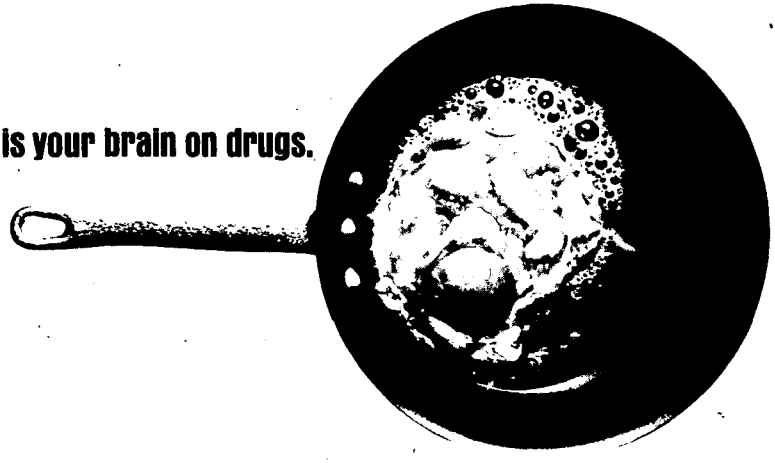

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the fact that the Lusitania Fleet weighed heavily on Qing-jao's mind, while Wang-mu had just been accepted as secret maid by a godspoken girl. Qing-jao led Wang-mu through the process of applying for employment with the house of Han—washing, fingerprinting, the security check—until she finally despaired of listening to Wang-mu's bubbling voice another moment and withdrew.

As she walked up the stairs to her room, Qing-jao could hear Wang-mu asking fearfully, "Have I made my new mistress angry?" And Ju Kung-mei, the guardian of the house, answered, "The godspoken answer to other voices than yours, little one." It was a kind answer. Qing-jao often admired the gentleness and wisdom of those her father had hired into his house. She wondered if she had chosen as wisely in her first hiring.

No sooner did she think of this worry than she knew she had acted wickedly to make such a decision so quickly, and without consulting her father beforehand. Wang-mu would be found to be hopelessly unsuitable, and Father would rebuke her for having acted foolishly.

Imagining Father's rebuke was enough to bring the immediate reproof of the gods. Qing-jao felt unclean. She rushed to her room and closed the door. It was bitterly ironic that she could think over and over again how hateful it was to perform the rituals the gods demanded, how empty their worship was—but let her think a disloyal thought about Father or Starways Congress, and she had to do penance at once.

Usually she would spend a half hour, an hour, perhaps longer, resisting the need for penance, enduring her own filthiness. Today, though, she hungered for the ritual of purification. In its own way, the ritual made sense, it had a structure, a beginning and end, rules to follow. Not at all like the problem of the Lusitania Fleet.

On her knees, she deliberately chose the narrowest, faintest grain in the palest board she could see. This would be a hard penance; perhaps then the gods would judge her clean enough that they could show her the solution to the problem Father had set for her. It took her half an hour to make her way across the room, for she kept losing the grain and had to start over each time.

At the end, exhausted from righteous labor and eye sore from the line-tracing, she wanted desperately to sleep; instead, she sat on the floor before her terminal and called up the summary of her work so far. After examining and eliminating all the useless absurdities that had cropped up during the investigation, Qing-jao had come up with three broad categories of possibility. First, that the disappearance was caused by some natural event that, at light-speed, had simply not become visible yet to the watching astronomers. Second, that the loss of ansible communications was the result of either sabotage or a command decision in the fleet. Third, that the loss of ansible communications was caused by some planetside conspiracy.

The first category was virtually eliminated by the way the fleet was traveling. The starships were simply not close enough together for any known natural phenomenon to destroy them all at once. The fleet had not rendezvoused before setting out—the ansible made such things a waste of time. Instead all the ships

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were moving toward Lusitania from wherever they happened to be when they were assigned to the fleet. Even now, with only five years of travel left before all were in orbit around Lusitania's star, they were so far apart that no conceivable natural event could possibly have affected them all at once.

The second category was made almost as unlikely by the fact that the *entire* fleet had disappeared, without exception. Could any human plan possibly work with such perfect efficiency—and without leaving any evidence of advance planning in any of the databases or personality profiles or communications logs that were maintained in planetside computers? Nor was there the slightest evidence that anyone had altered or hidden any data, or masked any communications to avoid leaving behind a trail of evidence. If it was a fleetside plan, there was neither evidence nor concealment nor error.

The same lack of evidence made the idea of a planetside conspiracy even more unlikely. And, making all these possibilities still less possible was the sheer simultaneity of it. As near as Qing-jao could determine, every single ship had broken off ansible communications at almost exactly the same time. There might have been a time lag of seconds, perhaps even minutes—but never as long as five minutes, never a gap long enough for someone on one ship to remark about the disappearance of another.

The summary was elegant in its simplicity. There was nothing left. The evidence made every conceivable explanation inconceivable.

That was the problem Qing-jao had been given. Or rather, that was the problem that Starways Congress had given to Han Fei-tzu, which he had assigned to Qing-jao as her coming-of-age task.

Why would Father do this to me? she wondered, not for the first time.

Immediately—as usual—she felt unclean even for asking such a question, for doubting her father's perfect correctness in all his decisions. She needed to wash, just a little, to take away the impurity of her doubt.

But she didn't wash. Instead she let the voice of the gods swell inside her, let their command grow more urgent. This time she wasn't resisting a righteous desire to grow more disciplined. This time she was deliberately trying to attract as much attention as possible from the gods. Only when she was panting with the need to cleanse herself, only when she shuddered at the most casual touch of her own flesh—a hand brushing a knee—only then did she voice her question.

"You did it, didn't you?" she said to the gods. "What no human being could have done, you must have done. You reached out and cut off the Lusitania Fleet."

The answer came, not in words, but in the ever-increasing need for purification.

"But Congress and the Admiralty are not of the Way. They can't imagine the golden door into the city of the jade mountain in the west. If Father says to them, 'The gods stole your fleet to punish you for wickedness,' they'll only despise him. If they despise him, our greatest living statesman, they'll despise us as well. And if Path is shamed

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because of Father, it will destroy him. Is that why you did this thing?"

She began to weep. "I won't let you destroy my father. I'll find another way. I'll find an answer that will satisfy them. I defy you!"

No sooner had she said the words than the gods sent her the most overpowering sense of her own abominable filthiness she had ever felt. It was so strong it took her breath away, and she fell forward, clutching at her terminal. She tried to speak, to plead for forgiveness, but she gagged instead, swallowed hard to keep from retching. She felt as though her hands were spreading slime on everything she touched; as she struggled to her feet, her gown clung across her flesh as if it were covered with thick black grease.

But she did not wash. Nor did she fall to the ground and trace lines in the wood. Instead she staggered to the door, meaning to go downstairs to her father's room.

The doorway caught her, though. Not physically—the door swung open easily as ever—but still she could not pass. She had heard of such things, how the gods captured their disobedient servants in doorways, but it had never happened to her before. She couldn't understand how she was being held. Her body was free to move. There was no barrier. But somehow she knew that she couldn't walk through, that the gods required some sort of penance, some sort of purification or they'd never let her leave the room.

She would not do it. She *would* not wash or trace lines for them. Not if they were trying to destroy her father, she wouldn't do it. Let the gods account her an enemy! Let them—oh, yes, let them despise her and cast her off and *never speak to her again*. She would rather be a servant in someone else's house, like poor Wang-mu, than be a servant to these hateful gods another hour.

As if in answer to her rebellious wish, it suddenly came to her how she might pass through the door. All she needed to do was fix her gaze on a point in the air just outside the upper-right corner of the door, and while never letting her gaze move from that spot, step backward through the door with her right foot, place her left hand through, then pivot leftward, bringing her left leg backward through the doorway, then her right arm forward. It was complicated and difficult, like a dance, but by moving very slowly and carefully, she did it.

The door released her. And though she still felt the pressure of her own filthiness, some of the intensity had faded. It was bearable. She could breathe without gasping, speak without gagging.

She went downstairs and rang the little bell outside her father's door.

"Is it my daughter, my Gloriously Bright?" asked Father.

"Yes, noble one," said Qing-jao. "I'm ready to receive you."

She opened Father's door and stepped through—no ritual was needed this time. She strode at once to where he sat on a pillow before his terminal and knelt before him on the floor.

"I have examined your Si Wang-mu," said Father, "and I believe your first hiring has been a worthy one."

It took a moment for Father's words to make sense. Si Wang-mu? Why did

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Father speak to her of an ancient god? She looked up in surprise, then looked where Father was looking—at a serving girl in a clean grey gown, kneeling demurely on a cushion, looking at the floor. It took a moment to remember the girl from the rice paddy, to remember that she was to be Qing-jao's secret maid. How could she have forgotten? It was only a few hours ago that Qing-jao left her. Yet in that time Qing-jao had battled with the gods, and if she hadn't won, at least she had not yet lost. What was the hiring of a servant compared to a struggle with the gods?

"Wang-mu is impertinent and ambitious," said Father, "but she is also honest and far more intelligent than I would have expected. I assume from her bright mind and sharp ambition that you both intend for her to be your student as well as your secret maid."

Wang-mu gasped, and when Qing-jao glanced over at her, she saw how horrified the girl looked. Oh, yes—she must think that *I* think that she told Father of our secret plan. "Don't worry, Wang-mu," said Qing-jao. "Father almost always guesses secrets. I know you didn't tell."

"I wish I could guess a few secrets harder than this one," said Father. "My daughter, I commend you for your worthy generosity. The gods will honor you for it, as I do also."

The words of praise came like unguent to a stinging wound. Perhaps this was why her rebelliousness had not destroyed her, why some god had taken mercy on her and shown her how to get through the door of her room just now. Because she had judged Wang-mu with mercy and wisdom, forgiving the girl's impertinence, Qing-jao herself was being forgiven, at least a little, for her own outrageous daring.

Wang-mu does not repent of her ambition, thought Qing-jao. Neither will I repent of my decision. I will not let the gods destroy Father because I can't find—or invent—a non-divine explanation for the disappearance of the Lusitania Fleet. And yet I can't withhold from Father the true solution: that the gods have hidden or destroyed the fleet. The works of the gods must be recognized by their obedient servants, even if they must remain hidden from unbelievers on other worlds.

"Father," said Qing-jao, "I must speak to you about my task."

Father misunderstood her hesitation. "We can speak in front of Wang-mu. She's been hired now as your secret maid. The hiring bonus has been sent to her father, the first barriers of secrecy have been suggested to her mind. We can trust her to hear us and never tell."

"Yes, Father," said Qing-jao. In truth she had again forgotten that Wang-mu was even there. "Father, I know who has hidden the Lusitania Fleet. But you must promise me that you will never tell it to Starways Congress."

Father, who was usually placid, looked mildly distressed. "I can't promise such a thing," he said. "It would be unworthy of me to be such a disloyal servant."

What could she do, then? How could she speak?—and yet how could she keep from speaking? "Who is your master?" she cried. "Congress or the gods?"

"First the gods," said Father. "They are always first."

"Then I must tell you that I have

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discovered that the gods are the ones who have hidden the fleet from us, Father. But if you tell this to the Congress, they'll mock you and you'll be ruined." Then another thought occurred to her. "If it was the gods who stopped the fleet, Father, then the fleet must have been against the will of the gods after all. And if Starways Congress sent the fleet against the will of—"

Father held up his hand for her to be silent. She immediately stopped speaking and bowed her head. She waited.

"Of course it's the gods," said Father.

His words came as both a relief and a humiliation. *Of course* he had said. Did he know this all along?

"The gods do all things that are done in the universe. But do not assume that you know *why*. You say they must have stopped the fleet because they oppose its mission. But I say that Congress couldn't have sent the fleet in the first place if the gods had not willed it. So why couldn't it be that the gods stopped the fleet because its mission was so great and noble that humanity was not worthy of it? Or what if they stopped the fleet because it would provide a difficult test for you? One thing is certain: The gods have permitted Starways Congress to hold sway over most of humanity. As long as they have the mandate of heaven, we of Path will follow their edicts without opposition."

"I did not mean to oppose . . ." She could not finish such an obvious falsehood.

Father understood perfectly, of course. "I hear how your voice fades and your words trail off into nothing. This is because you know your words are *not* true. You meant to oppose Starways Congress, in spite of all I have taught you." Then his voice grew gentler. "For my sake you meant to do it."

"You are my ancestor. I owe you a higher duty than I owe them."

"I'm your father. I won't become your ancestor until I'm dead."

He was joking, she knew. She had been taught from childhood that one must treat one's parents and grandparents like the greatest of ancestors, because they are the only ancestors one ever knows face to face—even though, being alive, they are not half so powerful as the dead.

"I tell you now, my Gloriously Bright daughter, that opposing Congress will never be for my good. Or yours either. But I forgive you for loving me to excess. It is the gentlest and kindest of vices."

He smiled. It did much to calm her agitation. Qing-jao was able to think again, to return to the puzzle. "You knew that the gods did this, and yet you made me search for the answer."

"But were you asking the right question?" said Father. "The question we need answered is: *How* did the gods do it?"

"How can I know?" answered Qing-jao. "They might have destroyed the fleet or hidden it, or carried it away to some secret place in the West—"

"Qing-jao! Look at me. Hear me well."

She looked. His stern command helped calm her, give her focus.

"This is something I have tried to teach you all your life, but now you *must* learn it, Qing-jao. The gods are the cause of everything that happens,

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but they *never* act except in disguise. Do you hear me?"

She nodded. She'd heard those words a hundred times.

"You hear and yet you don't understand me, even now," said Father. "The gods have chosen the people of Path, Qing-jao. Only *we* are privileged to hear their voice. Only *we* are allowed to see that they are the cause of all that is and was and will be. To all other people their works remain hidden, a mystery. Your task is not to discover the *true* cause of the disappearance of the Lusitania Fleet—all of Path would know at once that the true cause is that the gods wished it to happen. Your task is to discover the disguise that the gods have created for this event."

Qing-jao felt light-headed, dizzy. She had been so certain that she had the answer, that she had fulfilled her task. Now it was slipping away. The answer was still true, but her task was different now.

"Right now, because we can't find a natural explanation, the gods stand exposed for all of humanity to see, the unbelievers as well as the believers. The gods are *naked,* and we must clothe them. We must find out the series of events the gods have created to explain the disappearance of the fleet, to make it appear natural to the unbelievers. I thought you understood this. We serve Starways Congress, but only because by serving Congress we also serve the gods. The gods wish us to deceive Congress, and Congress wishes to be deceived."

Qing-jao nodded, numb with disappointment that her task was still not finished.

"Does this sound heartless of me?" asked Father. "Am I dishonest? Am I cruel to the unbeliever?"

"Does a daughter judge her father?" whispered Qing-jao.

"Of course she does," said Father. "Every day all people judge all other people. The question is whether we judge wisely."

"Then I judge that it's no sin to speak to the unbelievers in the language of their unbelief," said Qing-jao.

Was that a smile now at the corners of his mouth? "You do understand," said Father. "If every Congress comes to us, humbly seeking to know the truth, then we will teach them the Way and they'll become part of Path. Until then, we serve the gods by helping the unbelievers deceive themselves into thinking that all things happen because of natural explanations."

Qing-jao bowed until her head nearly touched the floor. "You have tried to teach me this many times, but until now I never had a task that this principle applied to. Forgive the foolishness of your unworthy daughter."

"I have no unworthy daughter," said Father. "I have only my daughter who is Gloriously Bright. The principle you've learned today is one that few on Path will ever really understand. That's why only a few of us are able to deal directly with people from other worlds without baffling or confusing them. You have surprised me today, Daughter, not because you hadn't yet understood it, but because you have come to understand it so young. I was nearly ten years older than you before I discovered it."

"How can I learn something before you did, Father?" The idea of surpass-

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ing one of his achievements was almost unthinkable.

"Because you had me to teach you," said Father, "while I had to discover it for myself. But I see that it frightened you to think that perhaps you learned something younger than I did. Do you think it would dishonor me if my daughter surpassed me? On the contrary—there can be no greater honor to a parent than to have a child who is greater."

"I can never be greater than you, Father."

"In a sense that's true, Qing-jao. Because you are my child, all your works are included within mine, as a subset of mine, just as all of us are a subset of our ancestors. But you have so much potential for greatness inside you that I believe there'll come a time when I will be counted greater because of your works than because of my own. If ever the people of Path judge me worthy of some singular honor, it will be at least as much because of your achievements as my own."

With that Father bowed to her, not a courteous bow of dismissal, but a deep bow of respect, his head almost touching the floor. Not quite, for that would be outrageous, almost a mockery, if he actually touched his head to the floor in honor to his own daughter. But he came as close as dignity allowed.

It confused her for a moment, frightened her, then she understood. When he implied that his chance of being chosen god of Path depended on her greatness, he wasn't speaking of some vague future event. He was speaking of the here and now. He was speaking of her task. If she could find the gods' disguise, the natural explanation for the disappearance of the Lusitania Fleet, then his selection as god of Path would be assured. That was how much he trusted her. That was how important this task was. What was her coming of age, compared to her father's godhood? She must work harder, think better, and succeed where all the resources of the military and the Congress had failed. Not for herself, but for the gods and for her father's chance to become one of them.

Qing-jao withdrew from Father's room. She paused in the doorway and glanced at Wang-mu. One glance from the godspoken was enough to tell the girl to follow.

By the time Qing-jao got to her room she was shaking with the pent-up need for purification. All that she had done wrong today—her rebelliousness toward the gods, her refusal to accept purification earlier, her stupidity at not understanding her true task—it came together now. Not that she felt dirty; it wasn't washing she wanted, or self-loathing that she felt. After all, her unworthiness had been tempered by her father's praise, by the god who showed her how to pass through the door. And Wang-mu's having proven to be a good choice—that was a test that Qing-jao had passed, and boldly, too. So it wasn't vileness that made her tremble. She was *hungry* for purification. She longed for the gods to be with her as she served them. Yet no penance that she knew of would be enough to quell her hunger.

Then she knew: she must trace a line on every board in the room.

At once she chose her starting point, the southeast corner, she would begin each tracing at the eastern wall, so that her rituals would all move westward,

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toward the gods. Last of all would be the shortest board in the room, less than a meter long, in the northwest corner. It would be her reward, that her last tracing would be so brief and easy.

She could hear Wang-mu enter the room softly behind her, but Qing-jao had no time now for mortals. The gods were waiting. She knelt in the corner, scanned the grains to find the one the gods wanted her to follow. Usually she had to choose for herself, and then she always chose the most difficult one, so the gods wouldn't despise her. But tonight she was filled with instant certainty that the gods were choosing for her. The first line was a thick one, wavy but easy to see. Already they were being merciful! Tonight's ritual would be almost a conversation between her and the gods. She had broken through an invisible barrier today; she had come closer to her father's clear understanding. Perhaps someday the gods would speak to her with the sort of clarity that the common people believed all the godspoken heard.

"Holy one," said Wang-mu.

It was as though Qing-jao's joy were made of glass, and Wang-mu had deliberately shattered it. Didn't she know that when a ritual was interrupted, it had to begin again? Qing-jao rose up on her knees and turned to face the girl.

Wang-mu must have seen the fury on Qing-jao's face, but didn't understand it. "Oh, I'm sorry," she said at once, falling to her knees and bowing her head to the floor. "I forgot that I'm not to call you 'holy one.' I only meant to ask what you were looking for, so I could help you search."

It almost made Qing-jao laugh, that Wang-mu was so mistaken. Of course Wang-mu had no notion that Qing-jao was being spoken to by the gods. And now, her anger interrupted, Qing-jao was ashamed to see how Wang-mu feared her anger, it felt wrong for the girl to be touching her head to the floor. Qing-jao didn't like seeing another person so humiliated.

How did I frighten her so much? I was filled with joy, because the gods were speaking so clearly to me; but my joy was so selfish that when she innocently interrupted me, I turned a face of hate to her. Is this how I answer the gods? They show me a face of love, and I translate it into hatred toward the people, especially one who is in my power? Once again the gods have found a way to show me my unworthiness.

"Wang-mu, you mustn't interrupt me when you find me bowed down on the floor like that." And she explained to Wang-mu about the ritual of purification that the gods required of her.

"Must I do this also?" said Wang-mu.

"Not unless the gods tell you to."

"How will I know?"

"If it hasn't happened to you at your age, Wang-mu, it probably never will. But if it did happen, you'd know, because you wouldn't have the power to resist the voice of the gods in your mind."

Wang-mu nodded gravely. "How can I help you . . . Qing-jao?" She tried out her mistress' name carefully, reverently. For the first time Qing-jao realized that her name, which sounded sweetly affectionate when her father said it, could sound exalted when it was spoken with such awe. To be called

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Gloriously Bright at a moment when Qing-jao was keenly aware of her lack of luster was almost painful. But she would not forbid Wang-mu to use her name—the girl had to have *something* to call her, and Wang-mu's reverent tone would serve Qing-jao as a constant ironic reminder of how little she deserved it.

"You can help me by not interrupting," said Qing-jao.

"Should I leave, then?"

Qing-jao almost said yes, but then realized that for some reason the gods wanted Wang-mu to be part of this penance. How did she know? Because the thought of Wang-mu leaving felt almost as unbearable as the knowledge of her unfinished tracing. "Please stay," said Qing-jao. "Can you wait in silence? Watching me?"

"Yes . . . Qing-jao."

"If it goes on so long that you can't bear it, you may leave," said Qing-jao. "But only when you see me moving from the west to the east. That means I'm between tracings, and it won't distract me for you to leave, though you mustn't speak to me."

Wang-mu's eyes widened. "You're going to do this with every grain of wood in every board of the floor?"

"No," said Qing-jao. The gods would never be so cruel as that! But even as she thought this, Qing-jao knew that someday there might come a time when the gods would require exactly that penance. It made her sick with dread. "Only one line in each board in the room. Watch with me, will you?"

She saw Wang-mu glance at the time message that glowed in the air over her terminal. It was already time for sleep, and both of them had missed their afternoon nap. It wasn't natural for human beings to go so long without sleep. The days on Path were half again as long as those on Earth, so that the days never worked out quite evenly with the internal cycles of the human body. To miss the daynap and then delay the nightsleep was a very hard thing.

But Qing-jao had no choice. And if Wang-mu couldn't stay awake, she'd have to leave now, however the gods resisted that idea. "You must stay awake," said Qing-jao. "If you fall asleep, I'll have to speak to you so you'll move and uncover some of the lines I have to trace. And if I speak to you, I'll have to begin again. Can you stay awake, silent and unmoving?"

Wang-mu nodded. Qing-jao believed that she meant it; she did not really believe the girl could do it. Yet the gods insisted that she let her new secret maid remain—who was Qing-jao to refuse what the gods required of her?

Qing-jao returned to the first board and started her tracing over again. To her relief, the gods were still with her. On board after board she was given the boldest, easiest grain to follow; and when, now and then, she was given a harder one, it invariably happened that the easy grain faded or disappeared off the edge of the board partway along. The gods were caring for her.

As for Wang-mu, the girl struggled mightily. Twice, on the passage back from the west to begin again in the east, Qing-jao glanced at Wang-mu and saw her sleeping. But when Qing-jao began passing near to the place where Wang-mu had lain, she found that her secret maid had wakened and moved so quietly

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to a place where Qing-jao had already traced that Qing-jao hadn't even heard her movements. A good girl. A worthy choice for a secret maid.

At last, at long last Qing-jao reached the beginning of the last board, a short one in the very corner. She almost spoke aloud in joy, but caught herself in time. The sound of her own voice and Wang-mu's inevitable answer would surely send her back to start again—it would be an unbelievable folly. Qing-jao bent over the beginning of the board, already less than a meter from the northwest corner of the room, and began tracing the boldest line. It led her, clear and true, right to the wall. It was done.

Qing-jao slumped against the wall and began laughing in relief. But she was so weak and tired that her laughter must have sounded like weeping to Wang-mu. In moments the girl was with her, touching her shoulder. "Qing-jao," she said. "Are you in pain?"

Qing-jao took the girl's hand and held it. "Not in pain. Or at least no pain that sleeping won't cure. I'm finished. I'm clean."

Clean enough, in fact, that she felt no reluctance in letting her hand clasp Wang-mu's hand, skin to skin, without filthiness of any kind. It was a gift from the gods, that she had someone's hand to hold when her ritual was done. "You did very well," said Qing-jao. "It was easier for me to concentrate on the tracing, with you in the room."

"I think I fell asleep once, Qing-jao."

"Perhaps twice. But you woke when it mattered, and no harm was done."

Wang-mu began to weep. She closed her eyes but didn't take her hand away from Qing-jao to cover her face. She simply let the tears flow down her cheeks.

"Why are you weeping, Wang-mu?"

"I didn't know," she said. "It really *is* a hard thing to be godspoken. I didn't know."

"And a hard thing to be a true friend to the godspoken, as well," said Qing-jao. "That's why I didn't want you to be my servant, calling me 'holy one' and fearing the sound of my voice. That kind of servant I'd have to send out of my room when the gods spoke to me."

If anything, Wang-mu's tears flowed harder.

"Si Wang-mu, is it too hard for you to be with me?" asked Qing-jao.

Wang-mu shook her head.

"If it's ever too hard, I'll understand. You can leave me then. I was alone before. I'm not afraid to be alone again."

Wang-mu shook her head, fiercely this time. "How could I leave you, now that I see how hard it is for you?"

"Then it will be written one day, and told in a story, that Si Wang-mu never left the side of Han Qing-jao during her purifications."

Suddenly Wang-mu's smile broke across her face, and her eyes opened into the squint of laughter, despite the tears still shining on her cheeks. "Don't you hear the joke you told?" said Wang-mu. "My name—Si Wang-mu. When they tell that story, they won't know it was your secret maid with you. They'll think it was the Royal Mother of the West."

Qing-jao laughed then, too. But an idea also crossed her mind, that perhaps the Royal Mother was a true ancestor-

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of-the-heart to Wang-mu, and by having Wang-mu by her side, as her friend, Qing-jao also had a new closeness with this god who was almost the oldest of them all.

Wang-mu laid out their sleeping mats, though Qing-jao had to show her how; it was Wang-mu's proper duty, and Qing-jao would have let her do it every night, though she had never minded doing it herself. As they lay down, their mats touching edge-to-edge so that no wood-grain lines showed between them, Qing-jao noticed that there was grey light shining through the slats of the windows. They had stayed awake together all through the day and now all through the night. Wang-mu's sacrifice was a noble one. She would be a true friend.

A few minutes later, though, when Wang-mu was asleep and Qing-jao was on the brink of dozing, it occurred to Qing-jao to wonder exactly how it was that Wang-mu, a girl with no money, had managed to bribe the foreman of the righteous labor crew to let her speak to Qing-jao today without interruption. Could some spy have paid the bribe for her, so she could infiltrate the house of Han Fei-tzu? No—Ju Kung-mei, the guardian of the House of Han, he would have found out about such a spy and Wang-mu would never have been hired. Wang-mu's bribe wouldn't have been paid in money. She was only fourteen, but Si Wang-mu was already a very pretty girl.

Grimly Qing-jao decided that the matter must be discreetly investigated, and the foreman dismissed in unnamed disgrace if it were found to be true; through the investigation, Wang-mu's name would never be mentioned in public, so that she would be protected from all harm. Qing-jao had only to mention it to Ju Kung-mei and he'd see that it was done.

Qing-jao looked at the sweet face of her sleeping servant, her worthy new friend, and felt overcome by sadness. What most saddened Qing-jao, however, was not the price Wang-mu had paid to the foreman, but rather that she had paid it for such a worthless, painful, terrible job as that of being secret maid to Han Qing-jao. If a woman must sell the doorway to her womb, as so many women had been forced to do through all of human history, surely the gods must let her receive something of value in return.

That is why Qing-jao went to sleep that morning even firmer in her resolve to devote herself to the education of Si Wang-mu. She could not let Wang-mu's education interfere with her struggle with the riddle of the Lusitania Fleet, but she would take all other possible time and give Wang-mu a fit blessing in honor of her sacrifice. Surely the gods must expect no less of her, in return for their having sent her such a perfect secret maid.

Qing-jao sat before her terminal, her eyes closed, thinking. Wang-mu was brushing Qing-jao's hair, the tugs, the strokes, the very breath of the girl was a comfort to her.

This was a time when Wang-mu could speak freely, without fear of interrupting her. And, because Wang-mu was Wang-mu, she used hair-brushing time for questions. She had so many questions.

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The first few days her questions had all been about the speaking of the gods. Of course, Wang-mu had been greatly relieved to learn that almost always tracing a single wood-grain line was enough —she had been afraid after that first time that Qing-jao would have to trace the whole floor every day.

But she still had questions about everything to do with purification. Why don't you just get up and trace a line every morning and have done with it? Why don't you just have the floor covered in carpet? It was so hard to explain that the gods can't be fooled by silly strategems like that.

What if there were no wood at all in the whole world? Would the gods burn you up like paper? Would a dragon come and carry you off?

Qing-jao couldn't answer Wang-mu's questions except to say that this is what the gods required of her. If there were no wood grain, the gods wouldn't require her to trace it. To which Wang-mu replied that they should make a law against wooden floors, then, so that Qing-jao could be shut of the whole business.

Those who hadn't heard the voice of the gods simply couldn't understand.

Today, though, Wang-mu's question had nothing to do with the gods—or, at least, had nothing to do with them *at first*.

"What is it that finally stopped the Lusitania Fleet?" asked Wang-mu.

Almost, Qing-jao simply took the question in stride; almost she answered with a laugh: If I knew that, I could rest! But then she realized that Wang-mu probably shouldn't even know that the Lusitania Fleet had disappeared.

"How would you know anything about the Lusitania Fleet?"

"I can *read*, can't I?" said Wang-mu, perhaps a little too proudly.

But why shouldn't she be proud? Qing-jao had told her, truthfully, that Wang-mu learned very quickly indeed, and figured out many things for herself. She was very intelligent, and Qing-jao knew she shouldn't be surprised if Wang-mu understood more than was told to her directly.

"I can see what you have on your terminal," said Wang-mu, "and it always has to do with the Lusitania Fleet. Also you discussed it with your father the first day I was here. I didn't understand most of what you said, but I knew it had to do with the Lusitania Fleet." Wang-mu's voice was suddenly filled with loathing. "May the gods piss in the face of the man who launched that fleet."

Her vehemence was shocking enough; the fact that Wang-mu was speaking against Starways Congress was unbelievable.

"Do you know who it was that launched the fleet?" asked Qing-jao.

"Of course. It was the selfish politicans in Starways Congress, trying to destroy any hope that a colony world could win its independence."

So Wang-mu *knew* she was speaking treasonously. Qing-jao remembered her own similar words, long ago, with loathing; to have them said again in her presence—and by her own secret maid —was outrageous. "What do you know of these things? These are matters for Congress, and here you are speaking of independence and colonies and—"

Wang-mu was on her knees, head

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bowed to the floor. Qing-jao was at once ashamed for speaking so harshly.

"Oh, get up, Wang-mu."

"You're angry with me."

"I'm shocked to hear you talk like that, that's all. Where did you hear such nonsense?"

"Everybody says it," said Wang-mu.

"Not everybody," said Qing-jao. "Father never says it. On the other hand, *Demosthenes* says that sort of thing all the time." Qing-jao remembered how she had felt when she first read the words of Demosthenes—how logical and right and fair he had sounded. Only later, after Father had explained to her that Demosthenes was the enemy of the rulers and therefore the enemy of the gods, only then did she realize how oily and deceptive the traitor's words had been, that had almost seduced her into believing that the Lusitania Fleet was evil. If Demosthenes had been able to come so close to fooling an educated godspoken girl like Qing-jao, no wonder that she was hearing his words repeated like truth in the mouth of a common girl.

"Who is Demosthenes?" asked Wang-mu.

"A traitor who is apparently succeeding better than anyone thought." Did Starways Congress realize that Demosthenes's ideas were being repeated by people who had never heard of him? Did anyone understand what this meant? Demosthenes's ideas were now the common wisdom of the common people. Things had reached a more dangerous turn than Qing-jao had imagined. Father was wiser; he must know already. "Never mind," said Qing-jao. "Tell me about the Lusitania Fleet."

"How can I, when it will make you angry?"

Qing-jao waited patiently.

"All right then," said Wang-mu, but she still looked wary. "Father says—and so does Pan Ku-wei, his very wise friend who once took the examination for the civil service and came very very close to passing—"

"What do they say?"

"That it's a very bad thing for Congress to send a huge fleet—and *so* huge—all to attack the tiniest colony simply because they refused to send away two of their citizens for trial on another world. They say that justice is completely on the side of Lusitania, because to send people from one planet to another against their will is to take them away from family and friends forever. That's like sentencing them before the trial."

"What if they're guilty?"

"That's for the courts to decide on their own world, where people know them and can measure their crime fairly, not for Congress to decide from far away where they know nothing and understand less." Wang-mu ducked her head. "That's what Pan Ku-wei says."

Qing-jao stilled her own revulsion at Wang-mu's traitorous words; it was important to know what the common people thought, even if the very hearing of it made Qing-jao sure the gods would be angry with her for such disloyalty. "So you think that the Lusitania Fleet should never have been sent?"

"If they can send a fleet against Lusitania for no good reason, what's to stop them from sending a fleet against

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Path? We're also a colony, not one of the Hundred Worlds, not a member of the Starways Congress. What's to stop them from declaring that Han Fei-tzu is a traitor and making him travel to some faraway planet and never come back for sixty years?"

The thought was a terrible one, and it was presumptuous of Wang-mu to bring her father into the discussion, not because she was a servant, but because it would be presumptuous of *anyone* to imagine the great Han Fei-tzu being convicted of a crime. Qing-jao's composure failed her for a moment, and she spoke her outrage: "Starways Congress would never treat my father like a criminal!"

"Forgive me, Qing-jao. You told me to repeat what my father said."

"You mean your *father* spoke of Han Fei-tzu?"

"All the people of Jonlei know that Han Fei-tzu is the most honorable man of Path. It's our greatest pride, that the house of Han is part of our city."

So, thought Qing-jao, you knew exactly how ambitious you were being when you set out to become his daughter's maid.

"I meant no disrespect, nor did they. But isn't it true that if Starways Congress wanted to, they could order Path to send your father to another world to stand trial?"

"They would never—"

"But *could* they?" insisted Wang-mu.

"Path is a colony," said Qing-jao. "The law allows it, but Starways Congress would never—"

"But if they did it to Lusitania, why wouldn't they do it to Path?"

"Because the xenologers on Lusitania were guilty of crimes that—"

"The people of Lusitania didn't think so. Their government refused to send them off for trial."

"That's the worst part. How can a planetary government dare to think they know better than Congress?"

"But they knew *everything*," said Wang-mu, as if this idea were so natural that everyone must know it. "They knew those people, those xenologers. If Starways Congress ordered Path to send Han Fei-tzu to go stand trial on another world for a crime we know he didn't commit, don't you think we would also rebel rather than send such a great man? And then they would send a fleet against us."

"Starways Congress is the source of all justice in the Hundred Worlds," Qing-jao spoke with finality. The discussion was over.

Impudently, Wang-mu didn't fall silent. "But Path isn't one of the Hundred Worlds yet, is it?" she said. "We're just a colony. They can do what they want, and that's not right."

Wang-mu nodded her head at the end, as if she thought she had utterly prevailed. Qing-jao almost laughed. She *would* have laughed, in fact, if she hadn't been so angry. Partly she was angry because Wang-mu had interrupted her many times and had even contradicted her, something that her teachers had always been very careful not to do. Still, Wang-mu's audacity was probably a good thing, and Qing-jao's anger was a sign that she had become too used to the undeserved respect people showed to her ideas simply because they fell from the lips of the god-

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spoken. Wang-mu must be encouraged to speak to her like this. That part of Qing-jao's anger was wrong, and she must get rid of it.

But much of Qing-jao's anger was because of the way Wang-mu had spoken about Starways Congress. It was as if Wang-mu didn't think of Congress as the supreme authority over all of humanity; as if Wang-mu imagined that Path was more important than the collective will of all the worlds. Even if the inconceivable happened and Han Fei-tzu was ordered to stand trial on a world a hundred light-years away, he would do it without a murmur—and he would be furious if anyone on Path made the slightest resistance. To rebel like Lusitania? Unthinkable. It made Qing-jao feel dirty just to think of it.

Dirty. Impure. To hold such a rebellious thought made her start searching for a wood-grain line to trace.

"Qing-jao!" cried Wang-mu, as soon as Qing-jao knelt and bowed over the floor. "Please tell me that the gods aren't punishing you for hearing the words I said!"

"They aren't punishing me," said Qing-jao. "They're purifying me."

"But they weren't even *my* words, Qing-jao. They were the words of people who aren't even here."

"They were impure words, whoever said them."

"But that's not fair, to make you cleanse yourself for ideas that you never even thought of or believed in!"

Worse and worse! Would Wang-mu never stop? "Now must I hear you tell me that the gods themselves are unfair?"

"They are if they punish you for other people's words!"

The girl was outrageous. "Now you are wiser than the gods?"

"They might as well punish you for being pulled on by gravity, or being fallen on by rain!"

"If they tell me to purify myself for such things, then I'll do it, and call it justice," said Qing-jao.

"Then justice has no meaning!" cried Wang-mu. "When you say the word, you mean whatever-the-gods-happen-to-decide. But when *I* say the word, I mean fairness, I mean people being punished only for what they did on purpose, I mean—"

"It's what the gods mean by justice that I must listen to."

"Justice is justice, whatever the gods might say!"

Almost Qing-jao rose up from the floor and slapped her secret maid. It would have been her right, for Wang-mu was causing her as much pain as if she had struck her. But it was not Qing-jao's way to strike a person who was not free to strike back. Besides, there was a far more interesting puzzle here. After all, the gods had sent Wang-mu to her—Qing-jao was already sure of that. So instead of arguing with Wang-mu directly, Qing-jao should try to understand what the gods *meant* by sending her a servant who would say such shameful, disrespectful things.

The gods had caused Wang-mu to say that it was unjust to punish Qing-jao for simply hearing another person's disrespectful opinions. Perhaps Wang-mu's statement was true. But it was also true that the gods could not be unjust. Therefore it must be that Qing-jao was not

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being punished for simply hearing the treasonous opinions of the people. No, Qing-jao had to purify herself because, in her heart of hearts, some part of her must *believe* those opinions. She must cleanse herself because deep inside she still doubted the heavenly mandate of Starways Congress; she still believed they were not just.

Qing-jao immediately crawled to the nearest wall and began looking for the right wood-grain line to follow. Because of Wang-mu's words, Qing-jao had discovered a secret filthiness inside herself. The gods had brought her another step closer to knowing the darkest places inside herself, so that she might someday be utterly filled with light and thus earn the name that till now had been only a mockery. Some part of me doubts the righteousness of Starways Congress. O gods, for the sake of my ancestors, my people, and my rulers, and last of all for me, purge this doubt from me and make me clean!

When she finished tracing the line—and it took only a single line to make her clean, which was a good sign that she had learned something true—there sat Wang-mu, watching her. All of Qing-jao's anger was gone now, and indeed she was grateful to Wang-mu for having been an unwitting tool of the gods in helping her learn new truth. But still, Wang-mu had to understand that she had been out of line.

"In this house, we are loyal servants of Starways Congress," said Qing-jao, her voice soft, her expression as kind as she could make it. "And if you're a loyal servant of this house, you'll also serve Congress with all your heart." How could she explain to Wang-mu how painfully she had learned that lesson herself—how painfully she was still learning it? She needed Wang-mu to help her, not make it harder.

"Holy one, I didn't know," said Wang-mu, "I didn't guess. I had always heard the name of Han Fei-tzu mentioned as the noblest servant of Path. I thought it was the Path that you served, not Congress, or I never would have—"

"Never would have come to work here?"

"Never would have spoken harshly about Congress," said Wang-mu. "I would serve you even if you lived in the house of a dragon."

Maybe I do, thought Qing-jao. Maybe the god who purifies me is a dragon, cold and hot, terrible and beautiful.

"Remember, Wang-mu, that the world called Path is not the Path itself, but only was named so to remind us to live the true Path every day. My father and I serve Congress because they have the mandate of heaven, and so the Path requires that we serve them even above the wishes or needs of the particular world called Path."

Wang-mu looked at her with wide eyes, unblinking. Did she understand? Did she believe? No matter—she would come to believe in time.

"Go away now, Wang-mu. I have to work."

"Yes, Qing-jao." Wang-mu immediately got up and backed away, bowing. Qing-jao turned back to her terminal. But as she began to call up more reports into the display, she became aware that someone was in the room with her. She whirled around on her chair, there in the doorway stood Wang-mu.

"What is it?" asked Qing-jao.

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"Is it the duty of a secret maid to tell you whatever wisdom comes to her mind, even if it turns out to be foolishness?"

"You can say whatever you like to me," said Qing-jao. "Have I ever punished you?"

"Then please forgive me, my Qing-jao, if I dare to say something about this great task you are working on."

What did Wang-mu know of the Lusitania Fleet? Wang-mu was a quick student, but Qing-jao was still teaching her at such a primitive level in every subject that it was absurd to think Wang-mu could even grasp the problems, let alone think of an answer. Nevertheless, Father had taught her: Servants are always happier when they know their voices are heard by their master. "Please tell me," said Qing-jao. "How can you say anything more foolish than the things *I* have already said?"

"My beloved elder sister," said Wang-mu, "I really got this idea from you. You've said so many times that nothing known to all of science and history could possibly have caused the fleet to disappear so perfectly, and all at once."

"But it happened," said Qing-jao, "and so it must be possible after all."

"What came to my mind, my sweet Qing-jao," said Wang-mu, "is something you explained to me as we studied logic. About first and final cause. All this time you have been looking for first causes—how the fleet was made to disappear. But have you looked for final causes—what someone hoped to accomplish by cutting off the fleet, or even destroying it?"

"Everyone knows *why* people want the fleet stopped. They're trying to protect the rights of colonies, or else they have some ridiculous idea that Congress means to destroy the pequeninos along with the whole colony. There are billions of people who want the fleet to stop. All of them are seditious in their hearts, and enemies of the gods."

"But somebody actually *did* it," said Wang-mu. "I only thought that since you can't find out what happened to the fleet directly, then maybe if you find out *who* made it happen, that will lead you to find out how they did it."

"We don't even know that it was done by a *who*," said Qing-jao. "It could have been a *what*. Natural phenomena don't have purposes in mind, since they don't have minds."

Wang-mu bowed her head. "I *did* waste your time, then, Qing-jao. Please forgive me. I should have left when you told me to go."

"It's all right," said Qing-jao.

Wang-mu was already gone; Qing-jao didn't know whether her servant had even heard her reassurance. Never mind, thought Qing-jao. If Wang-mu was offended, I'll make it up to her later. It was sweet of the girl to think she could help me with my task; I'll make sure she knows I'm glad she has such an eager heart.

With Wang-mu out of the room, Qing-jao went back to her terminal. She idly flipped the reports through her terminal's display. She had looked at all of them before, and had found nothing useful. Why should this time be different? Maybe these reports and summaries showed her nothing because there was nothing to show. Maybe the fleet disappeared because of some god-gone-berserk; there were stories of such things

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in ancient times. Maybe there was no evidence of human intervention because a human didn't do it. What would Father say about *that*, she wondered. How would Congress deal with a lunatic deity? They couldn't even track down that seditious writer Demosthenes—what hope did they have of tracking and trapping a god?

Whoever Demosthenes is, he's laughing right now, thought Qing-jao. All his work to persuade people that the government was wrong to send the Lusitania Fleet, and now the fleet has stopped, just as Demosthenes wanted.

Just as Demosthenes wanted. For the first time, Qing-jao made a mental connection that was so obvious she couldn't believe she hadn't thought of it before. It was so obvious, in fact, that the police in many a city had assumed that those who were already known to follow Demosthenes must surely have been involved in making the fleet disappear. They had rounded up everyone suspected of sedition and tried to force confessions out of them. But of course they hadn't actually questioned *Demosthenes*, because nobody knew who he was.

Demosthenes, so clever he has evaded discovery for years, despite all the searching of the Congress Police; Demosthenes, who is every bit as elusive as the cause of the disappearance of the fleet. If he could work the one trick, why not the other? Maybe if I find Demosthenes, I'll find out how the fleet was cut off. Not that I have any idea even where to start looking. But at least it's a different avenue of approach. At least it won't mean reading the same empty, useless reports over and over again.

Suddenly Qing-jao remembered who had said almost exactly the same thing, only moments before. She felt herself blushing, the blood hot in her cheeks. How arrogant I was, to condescend to Wang-mu, to patronize her for imagining she could help me with my lofty task. And now, not five minutes later, the thought she planted in my mind has blossomed into a plan. Even if the plan fails, she was the one who gave it to me, or at least started me thinking of it. Thus I was the fool to think her foolish. Tears of shame filled Qing-jao's eyes.

Then she thought of some famous lines from a song by her ancestor-of-the-heart:

I want to call back
the blackberry flowers
that have fallen
though pear blossoms remain

The poet Li Qing-jao knew the pain of regretting words that have already fallen from our lips and can never be called back. But she was wise enough to remember that even though those words are gone, there are still new words waiting to be said, like the pear blossoms.

To comfort herself for the shame of having been so arrogant, Qing-jao repeated all the words of the song; or at least she started to. But when she got to the line:

dragon boats on the river

her mind drifted to the Lusitania Fleet, imagining all those starships like riverboats, painted so fiercely, and yet drifting now with the current, so far

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from the shore that they can no longer be heard no matter how loud they shout.

From dragon boats her thoughts turned to dragon kites, and now she thought of the Lusitania Fleet as kites with broken strings, carried along by the wind, no longer tethered to the child who first gave them flight. How beautiful, to see them free; yet how terrifying it must be for them, who never wished for freedom.

I did not fear the mad winds
and violent rain

The words of the song came back to her again. I did not fear. Mad winds. Violent rain. I did not fear as:

we drank to good fortune
with warm blackberry wine
now I cannot conceive
how to retrieve
that time

My ancestor-of-the-heart could drink away her fear, thought Qing-jao, because she had someone to drink with. And even now,

alone on my mat with a cup
gazing sadly into nothingness

the poet remembers her gone companion. Whom do I remember now? thought Qing-jao. Where is my tender lover? What an age it must have been then, when the great Li Qing-jao was still mortal, and men and women could be together as tender friends without any worry about who was godspoken and who was not. Then a woman could live such a life that even in her loneliness she had memories. I can't even remember my mother's face. Only the flat pictures; I can't remember seeing her face turn and move while her eyes looked at me. I have only my Father, who is like a god; I can worship him and obey him and even love him but I can never be playful with him, not really; when I tease him I'm always watching to be sure he approves of the way I tease him. And Wang-mu—I talked so firmly about how we would be friends, and yet I treat her like a servant; I never for a moment forget who is godspoken and who is not. It's a wall that can never be crossed. I'm alone now and I'm alone forever.

a clear cold comes through
the window curtains
crescent moon beyond the golden bars

She shivered. I and the moon. Didn't the Greeks think of their moon as a cold virgin, a huntress? Is that not what I am now? Sixteen years old and untouched

and a flute sounds
as if someone were coming

I listen and listen but never hear the melody of someone coming. . . .

No. What she heard were the distant sounds of a meal being readied; a clattering of bowls and spoons, laughter from the kitchen. Her reverie broken, she reached up and wiped the foolish tears from her cheeks. How could she think of herself as lonely, when she lived in this full house where everyone had cared for her all her life? I sit here reciting to myself scraps of old poetry when I have work to do.

At once she began to call up the reports that had been made, investigations into the identity of Demosthenes.

The reports made her think for a moment that this was a dead end, too. More than three dozen writers on almost as many worlds had been arrested for producing seditious documents under that name. Starways Congress had reached the obvious conclusion: Demosthenes was simply the catch-all name used by

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any rebel who wanted to get attention. There was no real Demosthenes, not even an organized conspiracy.

But Qing-jao had doubts about that conclusion. Demosthenes had been remarkably successful in stirring up trouble on every world. Could there possibly be someone of so much talent among the traitors on every planet? Not likely.

Besides, thinking back to when she had read Demosthenes, Qing-jao remembered noticing the coherence of his writings. The singularity and consistency of his vision—that was part of what made him so seductive. Everything seemed to fit, to make sense together.

Hadn't Demosthenes also devised the Hierarchy of Foreignness? Framling, Raman, Varelse. No—that had been written many years ago—it had to be a different Demosthenes. Was it because of that earlier Demosthenes's Hierarchy that the traitors were using the name? They were writing in support of the independence of Lusitania, the only world where intelligent non-human life had been found. It was only appropriate to use the name of the writer who had first taught humanity to realize that the universe wasn't divided between humans and non-humans, or between intelligent and non-intelligent species.

Some strangers, that earlier Demosthenes had said, were framling—humans from another world. Some were raman—of another intelligent species, yet able to communicate with human beings, so that we could work out differences and make decisions together. Others were varelse, "wise beasts," clearly intelligent and yet completely unable to reach a common ground with humankind. Only with varelse would war ever be justified; with raman, humans could make peace and share the habitable worlds. It was an open way of thinking, full of hope that strangers might still be friends. People who thought that way could never have sent a fleet with Dr. Device to a world inhabited by an intelligent species.

This was a very uncomfortable thought: that the Demosthenes of the Hierarchy would also disapprove of the Lusitania Fleet. Almost at once Qing-jao had to counter it. It didn't matter what the old Demosthenes thought, did it? The new Demosthenes, the seditious one, was no wise philosopher trying to bring peoples together. Instead he was trying to sow dissension and discontent among the worlds—provoke quarrels, perhaps even wars, between framlings.

And Seditious Demosthenes was *not* just a composite of many rebels working on different worlds. Her computer search soon confirmed it. True, many rebels were found who had published on their own planet using the name Demosthenes, but they were always linked to small, ineffective, useless little publications—never to the really dangerous documents that seemed to turn up simultaneously on half the worlds at once. Each local police force, however, was very happy to declare their own petty "Demosthenes" the perpetrator of all the writings, take their bows, and close the case.

Starways Congress had been only too happy to do the same thing with their own investigation. Having found several dozen cases where local police had arrested and convicted rebels who had incontrovertibly published something

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under the name Demosthenes, the Congress investigators sighed contentedly, declared that Demosthenes had proved to be a catch-all name and not one person at all, and then stopped investigating.

In short, they had all taken the easy way out. Selfish, disloyal—Qing-jao felt a surge of indignation that such people were allowed to continue in their high offices. They should be punished, and severely, too, for having let their private laziness or their desire for praise lead them to abandon the investigation of Demosthenes. Didn't they realize that Demosthenes was truly dangerous? That his writings were now the common wisdom of at least one world, and if one, then probably many? Because of him, how many people on how many worlds would rejoice if they knew that the Lusitania Fleet had disappeared? No matter how many people the police had arrested under the name Demosthenes, his works kept appearing, and always in that same voice of sweet reasonableness. No, the more she read the reports, the more certain Qing-jao became that Demosthenes was one man, as yet undiscovered. One man who knew how to keep secrets impossibly well.

From the kitchen came the sound of the flute; they were being called to dinner. She gazed into the display space over her terminal, where the latest report still hovered, the name *Demosthenes* repeated over and over. "I know you exist, Demosthenes," she whispered, "and I know you are very clever, and I will find you. When I do, you will stop your war against the rulers, and you will tell me what has happened to the Lusitania Fleet. Then I will be done with you, and Congress will punish you, and Father will become the god of Path and live forever in the infinite West. That is the task that I was born for, the gods have chosen me for it, you might just as well show yourself to me now as later, for eventually all men and women lay their heads under the feet of the gods."

The flute played on, a breathy low melody, drawing Qing-jao out of herself and toward the company of the household. To her, this half-whispered music was the song of the inmost spirit, the quiet conversation of trees over a still pond, the sound of memories arising unbidden into the mind of a woman in prayer. Thus were they called to dine in the house of the noble Han Fei-tzu.

Having heard Qing-jao's challenge, Jane thought: This is what fear of death tastes like. Human beings feel this all the time, and yet somehow they go on from day to day, knowing that at any moment they may cease to be. But this is because they can forget something and still know it; I can never forget, not without losing the knowledge entirely. I know that Han Qing-jao is on the verge of finding secrets that have stayed hidden only because no one has looked hard for them. And when those secrets are known, I will die.

"Ender," she whispered.

Was it day or night on Lusitania? Was he awake or asleep? For Jane, to ask a question is either to know or not-know. It was night. He had been asleep, but now he was awake; he was still attuned to her voice, she realized, even though many silences had passed between them in the past few years.

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"Jane," he whispered.

Beside him his wife, Novinha, stirred in her sleep. Jane heard her, felt the vibration of her movement, saw the changing shadows through the jewel-like sensor that Ender wore in his ear. It was good that Jane had not yet learned to feel jealousy, or she might have hated Novinha for lying there, a warm body beside Ender's own. But Novinha, being human, was gifted at jealousy, and Jane knew how Novinha seethed whenever she saw Ender speaking to the woman who lived in the jewel in his ear. "Hush," said Jane. "Don't wake people up."

Ender answered by moving his lips and tongue and teeth, without letting anything louder than a breath pass his lips. "How fare our enemies in flight?" he said. He had greeted her this way for many years.

"Not well," said Jane.

"You shouldn't have interfered with them. We would have found a way. Valentine's writings—"

"Are about to be discovered."

"Everything's about to be discovered." He didn't say: because of you.

"Only because Lusitania was about to be destroyed," she answered. She also didn't say: because of you.

"They know about Valentine?"

"A girl is finding out. On the world of Path."

"I don't know the place."

"A fairly new colony, a couple of centuries. Chinese. Dedicated to preserving old religions. The gods speak to them."

"I lived on more than one Chinese world," said Ender. "People believed in the old gods on all of them. Gods are alive on every world, even here in the smallest human colony of all. They still have miracles of healing at the shrine of Os Venerados." The Honored Ones—Novinha's parents, already beatified and on their way to sainthood. "And," he added wryly, "the pequeninos commune constantly with the Holy Ghost."

"This business with gods is something I don't understand," said Jane. "Hasn't anyone caught on yet that the gods always say what people want to hear?"

"Not so," said Ender. "The gods often ask us to do things we never desired, things that require us to sacrifice everything on their behalf. Don't underestimate the gods."

"Does your Catholic God speak to you?"

"Maybe he does. I never hear him, though. Or if I do, I never know that it's his voice I'm hearing."

"And when you die, do the gods of every people really gather them up and take them off somewhere to live forever?"

"I don't know. They never write."

"And when I die, will there be some god to carry me away?"

Ender was still for a moment, and then he began to address her in his storytelling manner. "There's an old story of a dollmaker who never had a son. So he made a puppet that was so lifelike that it looked like a real boy, and he would hold the wooden boy on his lap and talk to it and pretend it was his son. He wasn't crazy—he still knew it was a doll—he called it Pinehead. But one day a god came and touched the puppet and it came to life, and when the doll-

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maker spoke to it, Pinehead answered. The dollmaker never told anyone about this. He kept his wooden son at home, but he brought the boy every tale he could gather and news of every wonder under heaven. Then one day the dollmaker was coming home from the wharf with tales of a far-off land that had just been discovered, when he saw that his house was on fire. Immediately he tried to run into the house, crying out, 'My son! My son!' But his neighbors stopped him, saying, 'Are you mad? You have no son!' He watched the house burn to the ground, and when it was over he plunged into the ruins and covered himself with hot ashes and wept bitterly. He refused to be comforted. He refused to rebuild his shop. When people asked him why, he said his son was dead. He stayed alive by doing odd jobs for other people, and they pitied him because they were sure the fire had made him a lunatic. Then one day, three years later, a small orphan boy came to him and tugged on his sleeve and said, 'Father, don't you have a tale for me?''

Jane waited, but Ender said no more. ''That's the whole story?''

''Isn't it enough?''

''Why did you tell me this? It's all dreams and wishes. What does it have to do with me?''

''It was the story that came to mind.''

''Why did it come to mind?''

''Maybe that's how God speaks to me,'' said Ender. ''Or maybe I'm sleepy and I don't have what you want from me.''

''I don't even *know* what I want from you.''

''*I* know what you want,'' said Ender. ''You want to be alive, with your own body, not dependent on the philotic web that binds the ansibles together. I'd give you that gift if I could. If you can figure out a way for me to do it, I'll do it for you. But Jane, you don't even know what you *are*. Maybe when you know how you came to exist, what makes you yourself, then maybe we can save you from the day when they shut down the ansibles to kill you.''

''So that's your story? Maybe I'll burn down with the house, but somehow my soul will end up in a three-year-old orphan boy?''

''Sure. That makes sense.''

''It makes no sense at all, Ender.''

''Look, Jane, the miracle wasn't that the doll was reborn as a boy. The miracle was the fact that the puppet ever came to life at all. Something happened to turn meaningless computer connections into a sentient being. Something created you. That's what makes no sense. After that one, the other part should be easy.''

His speech was slurring. He wants me to go away so he can sleep, she thought. ''I'll work on this.''

''Good night,'' he murmured.

He dropped off to sleep almost at once. Jane wondered: Was he ever really awake? Will he remember in the morning that we talked?

Then she felt the bed shift. Novinha; her breathing was different. Jane realized: Novinha woke up while Ender and I were talking. She knows what those almost inaudible clicking and smacking noises mean, that Ender is subvocalizing in order to talk with me. Ender may forget that we spoke tonight, but Novinha will not. As if she had caught him sharing a bed with a lover. If only she

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could think of me another way. As a daughter. As Ender's bastard daughter by a liaison long ago. His child by way of the hive queen. Would she be jealous then?

Am I Ender's child?

Jane began to search back in her own past. She began to study her own nature. She began to try to discover who she is and why she is alive.

But because she was Jane, and not a human being, that was not all she was doing. She was also tracking Qing-jao's searches through the data dealing with Demosthenes, watching her come closer and closer to the truth.

Jane's most urgent activity, however, was searching for a way to make Qing-jao want to stop trying to find her. This was the hardest task of all, for despite all Jane's experience with human minds, despite all her conversations with Ender, individual human beings were still mysterious. Jane had concluded: No matter how well you know what a person has done and what he thought he was doing when he did it and what he now thinks of what he did, it was impossible to be certain of what he would do next. Yet she had no choice but to try. So she began to watch the house of Han Fei-tzu in a way that she had watched no one but Ender and, more recently, his stepson Miro. She could no longer wait for Qing-jao and her father to enter data into the computer and try to understand them from that. Now she had to take control of the house computer in order to use the audio and video receptors on the terminals in almost every room to be her ears and eyes. She watched them. Alone and apart, she devoted a considerable part of her attention to them, studying and analyzing their words, their actions, trying to discern what they meant to each other.

It did not take her long to realize that Qing-jao could best be influenced, not by confronting her with arguments, but rather by persuading her father first and then letting him persuade Qing-jao. That was more in harmony with the Path; Han Qing-jao would never disobey Starways Congress unless Han Fei-tzu told her to, and then she would be bound to do it.

In a way, this made Jane's task much easier. Persuading Qing-jao, a volatile and passionate adolescent who did not yet understand herself at all, would be chancy at best. But Han Fei-tzu was a man of settled character, a rational man, yet a man of deep feeling; he could be persuaded by arguments, especially if Jane could convince him that opposing Congress was for the good of his world and of humanity at large. All she needed was the right information to let him reach that conclusion.

By now Jane already understood as much of the social patterns of Path as any human knew, because she had absorbed every history, every anthropological report, and every document produced by the people of Path. What she learned was disturbing: the people of Path were far more deeply controlled by their gods than any other people in any other place or time. Furthermore, the way that the gods spoke to them was disturbing. It was clearly the well-known brain defect called Obsessive-Compulsive Disorder—OCD. Early in the history of Path—seven generations before, when the world was first being settled—the doctors had treated the dis-

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order accordingly. But they discovered at once that the godspoken of Path did not respond at all to the normal drugs that in all other OCD patients restored the chemical balance of "enoughness," that sense in a person's mind that a job is completed and there is no need to worry about it anymore. The godspoken exhibited all the behaviors associated with OCD, but the well-known brain defect was not present. There must be another, an unknown cause.

Now Jane explored more deeply into this story, and found documents on other worlds, not on Path at all, that told more of the story. The researchers had immediately concluded that there must have been a new mutation that caused a related brain defect with similar results. But as soon as they issued their preliminary report, all the research ended and the researchers were assigned to another world.

To another *world*—that was almost unthinkable. It meant uprooting them and disconnecting them from time, carrying them away from all friends and family that didn't go with them. And yet not one of them refused—which surely meant that enormous pressure had been brought to bear on them. They all left Path and no one had pursued research along those lines in the years since then.

Jane's first hypothesis was that one of the government agencies on Path itself had exiled them and cut off their research; after all, the followers of the Path wouldn't want their faith to be disrupted by finding the physical cause of the speaking of the gods in their own brains. But Jane found no evidence that the local government had ever been aware of the full report. The only part of it that had ever circulated on Path was the general conclusion that the speaking of the gods was definitely *not* the familiar, and treatable, OCD. The people of Path had only learned enough of the report to feel confirmed that the speaking of the gods had no known physical cause. Science had "proved" that the gods were real. There was no record of anyone on Path taking any action to cause further information or research to be suppressed. Those decisions had all come from outside. From Congress.

There had to be some key information hidden even from Jane, whose mind easily reached into every electronic memory that was connected with the ansible network. That would only happen if those who knew the secret had feared its discovery so much they kept it completely out of even the most top-secret and restricted computers of government.

Jane could not let that stop her. She would have to piece together the truth from the scraps of information that would have been left inadvertently in unrelated documents and databases. She would have to find other events that helped fill in the missing parts of the picture. In the long run, human beings could never keep secrets from someone with Jane's unlimited time and patience. She would find out what Congress was doing with Path, and when she had the information, she would use it, if she could, to turn Han Qing-jao away from her destructive course. For Qing-jao, too, was opening up secrets—older ones, secrets that had been hidden for three thousand years.

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Wang-mu watched the words and numbers moving through the display above her mistress' terminal. Qing-jao was asleep, breathing softly on her mat not far away. Wang-mu had also slept for a time, but something had wakened her. A cry, not far off; a cry of pain perhaps. It had been part of Wang-mu's dream, but when she awoke she heard the last of the sound in the air. It was not Qing-jao's voice. A man perhaps, though the sound was high. A wailing sound. It made Wang-mu think of death.

But she did not get up and investigate. It was not her place to do that; her place was with her mistress at all times, unless her mistress sent her away. If Qing-jao needed to hear the news of what had happened to cause that cry, another servant would come and waken Wang-mu, who would then waken her mistress—for once a woman had a secret maid, and until she had a husband, only the hands of the secret maid could touch her without invitation.

So Wang-mu lay awake, waiting to see if someone came to tell Qing-jao why a man had wailed in such anguish, and near enough to be heard in this room at the back of the house of Han Fei-tzu. While she waited, her eyes were drawn to the moving display as the computer performed the searches Qing-jao had programmed.

The display stopped moving. Was there a problem? Wang-mu rose up to lean on one arm; it brought her close enough to read the most recent words of the display. The search was completed. And this time the report was not one of the curt messages of failure: NOT FOUND. NO INFORMATION. NO CONCLUSION. This time the message was a report.

Wang-mu got up and stepped to the terminal. She did as Qing-jao had taught her, pressing the key that logged all current information so the computer would guard it no matter what happened. Then she went to Qing-jao and laid a gentle hand on her shoulder.

Qing-jao came awake almost at once; she slept alertly. "The search has found something," said Wang-mu.

Qing-jao shed her sleep as easily as she might shrug off a loose jacket. In a moment she was at the terminal taking in the words there.

"I've found Demosthenes," she said.

"Where is he?" asked Wang-mu, breathless. The great Demosthenes—no, the terrible Demosthenes. My mistress wishes me to think of him as an enemy. But *the* Demosthenes, in any case, the one whose words had stirred her so when she heard her father reading them aloud. "As long as one being gets another to bow to him because he has the power to destroy him and all he has and all he loves, then all of us must be afraid together." Wang-mu had overheard those words almost in her infancy—she was only three years old—but she remembered them because they had made such a picture in her mind. When her father read those words, she had remembered a scene: her mother spoke and father grew angry. He didn't strike her, but he did tense his shoulder and his arm jerked a bit, as if his body had meant to strike and he had only with difficulty contained it. And when he did that, though no violent act was committed, Wang-mu's mother bowed her head and murmured something, and the

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tension eased. Wang-mu knew that she had seen what Demosthenes described: Mother had bowed to father because he had the power to hurt her. And Wang-mu had been afraid, both at the time and again when she remembered; so as she heard the words of Demosthenes she knew that they were true, and marveled that her father could say those words and even agree with them and not realize that he had acted them out himself. That was why Wang-mu had always listened with great interest to all the words of the great—the terrible—Demosthenes, because great or terrible, she knew that he told the truth.

"Not he," said Qing-jao. "Demosthenes is a woman."

The idea took Wang-mu's breath away. So! A woman all along. No wonder I heard such sympathy in Demosthenes; she is a woman, and knows what it is to be ruled by others every waking moment. She is a woman, and so she dreams of freedom, of an hour in which there is no duty waiting to be done. No wonder there is revolution burning in her words, and yet they remain always words and never violence. But why doesn't Qing-jao see this? Why has Qing-jao decided we must both hate Demosthenes?

"A woman named Valentine," said Qing-jao; and then, with awe in her voice, "Valentine Wiggin, born on Earth more than three—more than three thousand years ago."

"Is she a god, to live so long?"

"Journeys. She travels from world to world, never staying anywhere more than a few months. Long enough to write a book. All the great histories under the name Demosthenes were written by that same woman, and yet nobody knows it. How can she not be famous?"

"She must want to hide," said Wang-mu, understanding very well why a woman might want to hide behind a man's name. I'd do it too, if I could, so that I could also journey from world to world and see a thousand places and live ten thousand years.

"Subjectively she's only in her fifties. Still young. She stayed on one world for many years, married and had children. But now she's gone again. To—" Qing-jao gasped.

"Where?" asked Wang-mu.

"When she left her home she took her family with her—to Lusitania."

Wang-mu's first thought was: Of course! That's why Demosthenes has such sympathy and understanding for the Lusitanians. She has talked to them—to the rebellious xenologers, to the pequeninos themselves. She has met them and *knows* that they are raman!

Then she thought: if the Lusitania Fleet arrives there and fulfils its mission, Demosthenes will be captured and her words will end.

And then she realized something that made this all impossible. "How could she be on Lusitania, when Lusitania has destroyed its ansible? Wasn't that the first thing they did when they went into revolt? How can her writings be reaching us?"

Qing-jao shook her head. "She hasn't reached Lusitania yet. Or if she has, it's only in the last few months. She's been in flight for the last twenty years. Since before the rebellion. She left before the rebellion."

"Then all her writings have been done in flight?" Wang-mu tried to

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imagine how the different time flows would be reconciled. "To have written so much since the Lusitania fleet left, she must have—" .

"Must have been spending every waking moment on the starship, writing and writing and writing," said Qing-jao. "And yet there's no record of her starship having sent any signals anywhere, except for the captain's reports. How has she been getting her writings distributed to so many different worlds, if she's been on a starship the whole time? It's impossible. There'd be some record of the ansible transmissions, *somewhere*."

"It's always the ansible," said Wang-mu. "The Lusitania fleet stops sending messages, and her starship must be sending them but it isn't. Who knows? Maybe Lusitania is sending secret messages, too."

"There can't be any secret messages," said Qing-jao. "The ansible's philotic connections are permanent, and if there's any transmission at any frequency, it would be detected and the computers would keep a record of it."

"Well, there you are," said Wang-mu. "If the ansibles are all still connected, and the computers don't have a record of transmissions, and yet we know that there *have* been transmissions because Demosthenes has been writing all these things, then the records must be wrong."

"There is no way for anyone to hide an ansible transmission," said Qing-jao. "Not unless they were right in there at the very moment the transmission was received, switching it away from the normal logging programs and—anyway, it can't be done. A conspirator would have to be sitting at every ansible all the time, working so fast that—"

"Or they could have a program that did it automatically."

"But then we'd know about the program—it would be taking up memory, it would be using processor time."

"If somebody could make a program to intercept the ansible messages, couldn't they also make it hide itself so it didn't show up in memory and left no record of the processor time it used?"

Qing-jao looked at Wang-mu in anger. "Where did you learn so many questions about computers and you still don't know that things like that can't be done!"

Wang-mu bowed her head and touched it to the floor. She knew that humiliating herself like this would make Qing-jao ashamed of her anger and they could talk again.

"No," said Qing-jao, "I had no right to be angry, I'm sorry. Get up, Wang-mu. Keep asking questions. Those are good questions. It might be possible because you can think of it, and if you can think of it maybe somebody could do it. But here's why I think it's impossible: because how could anybody install such a masterful program on—it would have to be in every computer that processes ansible communications anywhere. Thousands and thousands of them. And if one breaks down and another one comes on-line, it would have to download the program into the new computer almost instantly. And yet it could never put itself into permanent storage or it would be found there; it must keep moving itself all the time, dodging, staying out of the way of other programs, moving into and out of stor-

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age. A program that could do all that would have to be—intelligent; it would have to be *trying* to hide and figuring out new ways to do it all the time or we would have noticed it by now and we never have. There's no program like that. How would anyone have ever programmed it? How could it have started? And look, Wang-mu—this Valentine Wiggin who writes all of the Demosthenes's things—she's been hiding herself for thousands of years. If there's a program like that it must have been in existence the whole time. It wouldn't have been made up by the enemies of Starways Congress because there *wasn't* a Starways Congress when Valentine Wiggin started hiding who she was. See how old these records are that gave us her name? She hasn't been openly linked to Demosthenes since these earliest reports from—from *Earth*. Before starships. Before . . ."

Qing-jao's voice trailed off, but Wang-mu already understood, had reached this conclusion before Qing-jao vocalized it. "So if there's a secret program in the ansible computers," said Wang-mu, "it must have been there all along. Right from the start."

"Impossible," whispered Qing-jao. But since everything else was impossible, too, Wang-mu knew that Qing-jao loved this idea, that she wanted to believe it because even though it was impossible at least it was *conceivable*, it could be imagined and therefore it might just be real. And I conceived of it, thought Wang-mu. I may not be godspoken but I'm intelligent, too. I understand things. Everybody treats me like a foolish child, even Qing-jao, even though Qing-jao knows how quickly I learn, even though she knows that I think of ideas that other people don't think of—even she despises me. But I am as smart as anyone, Mistress! I am as smart as you, even though you never notice that, even though you will think you thought of this all by yourself. Oh, you'll give me credit for it, but it will be like this: Wang-mu said something and it got me thinking and then I realized the important idea. It will never be: Wang-mu was the one who understood this and explained it to me so I finally understood it. Always as if I were a stupid dog who happens to bark or yip or scratch or snap or leap, just by coincidence, and it happens to turn your mind toward the truth. I am not a dog. I understood. When I asked you those questions it was because I already realized the implications. And I realize even more than you have said so far—but I must tell you this by asking, by pretending not to understand, because you are godspoken and a mere servant could never give ideas to one who hears the voices of the gods.

"Mistress, whoever controls this program has enormous power, and yet we've never heard of them and they've never used this power until now."

"They've used it," said Qing-jao. "To hide Demosthenes's true identity. This Valentine Wiggin is very rich, too, but her ownerships are all concealed so that no one realizes how much she has, that all of her possessions are part of the same fortune."

"This powerful program has dwelt in every ansible computer since starflight began, and yet all it ever did was hide this woman's fortune?"

"You're right," said Qing-jao, "it

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makes no sense at all. Why didn't someone with this much power already use it to take control of things? Or perhaps they did. They were there before Starways Congress was formed, so maybe they . . . but then why would they oppose Congress now?"

"Maybe," said Wang-mu, "maybe they just don't *care* about power."

"Who doesn't?"

"Whoever controls this secret program."

"Then why would they have created the program in the first place? Wang-mu, you aren't thinking."

No, of course not, I never think. Wang-mu bowed her head.

"I mean you *are* thinking, but you're not thinking of *this:* Nobody would create such a powerful program unless they wanted that much power—I mean, think of what this program does, what it *can* do—intercept every message from the fleet and make it look like none were ever sent! Bring Demosthenes's writings to every settled planet and yet hide the fact that *those* messages were sent! They could do anything, they could alter any message, they could spread confusion everywhere or fool people into thinking—into thinking there's a war, or give them orders to do *anything*, and how would anybody know that it wasn't true? If they really had so much power, they'd use it! They would!"

"Unless maybe the programs don't want to be used that way."

Qing-jao laughed aloud. "Now, Wang-mu, that was one of our first lessons about computers. It's all right for the common people to imagine that computers actually decide things, but you and I know that computers are only servants, they only do what they're told, they never actually *want* anything themselves."

Wang-mu almost lost control of herself, almost flew into a rage. Do you think that never wanting anything is a way that computers are *similar* to servants? Do you really think that we servants do only what we're told and never want anything ourselves? Do you think that just because the gods don't make us rub our noses on the floor or wash our hands till they bleed that we don't have any *other* desires?

Well if computers and servants are just alike, then it's because computers *have* desires, not because servants *don't* have them. Because we want. We yearn. We hunger. What we never do is act on those hungers, because if we did you godspoken ones would send us away and find others more obedient.

"Why are you angry?" asked Qing-jao.

Horrified that she had let her feelings show on her face, Wang-mu bowed her head. "Forgive me," she said.

"Of course I forgive you, I just want to understand you as well," said Qing-jao. "Were you angry because I laughed at you? I'm sorry—I shouldn't have. You've only been studying with me for these few months, so of course you sometimes forget and slip back to the beliefs you grew up with, and it's wrong of me to laugh. Please, forgive me for that."

"Oh, Mistress, it's not my place to forgive you. You must forgive *me*."

"No, I was wrong. I know it—the gods have shown me my unworthiness for laughing at you."

Then the gods are very stupid, if they

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think it was your *laughter* that made me angry. Either that or they're lying to you. I hate your gods and how they humiliate you without ever telling you a single thing worth knowing. So let them strike me dead for thinking *that* thought!

But Wang-mu knew that wouldn't happen. The gods would never lift a finger against Wang-mu herself. They'd only make Qing-jao—who *was* her friend, in spite of everything—they'd make Qing-jao bow down and trace the floor until Wang-mu felt so ashamed that she wanted to die.

"Mistress," said Wang-mu, "you did nothing wrong and I was never offended."

It was no use. Qing-jao was on the floor. Wang-mu turned away, buried her face in her hands—but kept silent, refusing to make a sound even in her weeping, because that would force Qing-jao to start over again. Or it would convince her that she had hurt Wang-mu so badly that she had to trace two lines, or three, or—let the gods not require it!—the whole floor again. Someday, thought Wang-mu, the gods will tell Qing-jao to trace every line on every board in every room in the house and she'll die of thirst or go mad trying to do it.

To stop herself from weeping in frustration, Wang-mu forced herself to look at the terminal and read the report that Qing-jao had read. Valentine Wiggin was born on Earth during the bugger wars. She had started using the name Demosthenes as a child, at the same time as her brother Peter, who used the name Locke and went on to be Hegemon. She wasn't simply *a* Wiggin—she was one of *the* Wiggins, sister of Peter the Hegemon and Ender the Xenocide. She had been only a footnote in the histories—Wang-mu hadn't even remembered her name till now, just the fact that the great Peter and the monster Ender had a sister. But the sister turned out to be just as strange as her brothers; she was the immortal one; she was the one who kept on changing humanity with her words.

Wang-mu could hardly believe this. Demosthenes had already been important in her life, but now to learn that the real Demosthenes was sister of the first hegemon! The one whose story was told in the holy book of the speakers for the dead: *The Hive Queen and the Hegemon*. Not that it was holy only to them. Practically every religion had made a space for that book, because the story was so strong—about the destruction of the first alien species humanity ever discovered, and then about the terrible good and evil that wrestled in the soul of the first man ever to unite all of humanity under one government. Such a complex story, and yet told so simply and clearly that many people read it and were moved by it when they were children. Wang-mu had first heard it read aloud when she was five. It was one of the deepest stories in her soul.

She had dreamed once that she met the hegemon himself, Peter, only he insisted that she call him by his network name, Locke. She was both fascinated and repelled by him; she could not look away. Then he reached out his hand and said, Si Wang-mu, Royal Mother of the West, only you are a fit consort for the ruler of all humanity, and he took her and married her and she sat beside him on his throne.

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Now, of course, she knew that almost every poor girl had dreams of marrying a rich man or finding out she was really the child of a rich family or some other such nonsense. But dreams were also sent from the gods, and there was truth in any dream you had more than once; everyone knew that. So she still felt a strong affinity for Peter Wiggin; and now, to realize that Demosthenes, for whom she had also felt great admiration, was his sister—that was almost too much of a coincidence to bear. I don't care what my mistress says, Demosthenes! cried Wang-mu silently. I love you anyway, because you have told me the truth all my life. And I love you also as the sister of the hegemon, who is the husband of my dreams.

Wang-mu felt the air in the room change, she knew the door had been opened. She looked, and there stood Mu-pao, the ancient and most dreaded housekeeper herself, the terror of all servants—including Wang-mu, even though Mu-pao had relatively little power over a secret maid. At once Wang-mu moved to the door, as silently as possible so as not to interrupt Qing-jao's purification.

Out in the hall, Mu-pau closed the door to the room so Qing-jao wouldn't hear.

"The master calls for his daughter. He's very agitated; he cried out awhile ago, and frightened everyone."

"I heard the cry," said Wang-mu. "Is he ill?"

"I don't know. He's very agitated. He sent me for your mistress and says he must talk to her at once. But if she's communing with the gods, he'll understand; make sure you tell her to come to him as soon as she's done."

"I'll tell her now. She has told me that nothing should stop me from answering the call of her father," said Wang-mu.

Mu-pao looked aghast at the thought. "But it's forbidden to interrupt when the gods are—"

"Qing-jao will do a greater penance later. She will want to know her father is calling her." It gave Wang-mu great satisfaction to put Mu-pao in her place. You may be ruler of the houseservants, Mu-pao, but *I* am the one who has the power to interrupt even the conversation between my godspoken mistress and the gods themselves.

As Wang-mu expected, Qing-jao's first reaction to being interrupted was bitter frustration, fury, weeping. But when Wang-mu bowed herself abjectly to the floor, Qing-jao immediately calmed. This is why I love her and why I can bear serving her, thought Wang-mu, because she does not love the power she has over me and because she has more compassion than any of the other godspoken I have heard of. Qing-jao listened to Wang-mu's explanation of why she had interrupted, and then embraced her. "Ah, my friend Wang-mu, you are very wise. If my father has cried out in anguish and then called to me, the gods know that I must put off my purification and go to him."

Wang-mu followed her down the hallway, down the stairs, until they knelt together on the mat before Han Fei-tzu's chair.

Qing-jao waited for Father to speak, but he said nothing. Yet his hands trem-

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bled. She had never seen him so anxious.

"Father," said Qing-jao, "why did you call me?"

He shook his head. "Something so terrible—and so wonderful—I don't know whether to shout for joy or kill myself." Father's voice was husky and out of control. Not since Mother died—no, not since Father had held her after the test that proved she was god-spoken—not since then had she heard him speak so emotionally.

"Tell me, Father, and then I'll tell you my news—I've found Demosthenes, and I may have found the key to the disappearance of the Lusitania Fleet."

Father's eyes opened wider. "On this day of all days, you've solved the problem?"

"If it is what I think it is, then the enemy of Congress can be destroyed. But it will be very hard. Tell me what you've discovered!"

"No, you tell me first. This is strange—both happening on the same day. Tell me!"

"It was Wang-mu who made me think of it. She was asking questions about—oh, about how computers work—and suddenly I realized that if there were in every ansible computer a hidden program, one so wise and powerful that it could move itself from place to place to stay hidden, then that secret program could be intercepting all the ansible communications. The fleet might still be there, might even be sending messages, but we're not receiving them and don't even know that they exist because of these programs."

"In *every* ansible computer? Working flawlessly all the time?" Father sounded skeptical, of course, because in her eagerness Qing-jao had told the story backward.

"Yes, but let me tell you how such an impossible thing might be possible. You see, I found Demosthenes."

Father listened as Qing-jao told him all about Valentine Wiggin, and how she had been writing secretly as Demosthenes all these years. "*She* is clearly able to send secret ansible messages or her writings couldn't be distributed from a ship in flight to all the different worlds. And if she can do it, if the program exists to allow her to do it, then that same program would clearly have the power to intercept the ansible messages from the fleet."

"If A, then B, yes—but how could this woman have planted a program in every ansible computer in the first place?"

"Because she *did* it at the first! That's how old she is. In fact, if Hegemon Locke was her brother, perhaps—no, of *course*—*he* did it! When the first colonization fleets went out, with their philotic double-triads aboard to be the heart of each colony's first ansible, he could have sent that program with them."

Father understood at once, of course he did. "As Hegemon he had the power, and the reason as well—a secret program under his control, so that if there were a rebellion or a coup, he would still hold in his hands the threads that bind the worlds together."

"And when he died, Demosthenes—his sister—she was the only one who knew the secret! Isn't it wonderful? We've found it. All we have to do is

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wipe all those programs out of memory!''

''Only to have the programs instantly restored through the ansible by other copies of the program on other worlds,'' said Father. ''It must have happened a thousand times before over the centuries, a computer breaking down and the secret program restoring itself on the new one.''

''Then we have to cut off all the ansibles at the same time,'' said Qing-jao. ''On every world, have a new computer ready that has never been contaminated by any contact with the secret program. Shut the ansibles down all at once, cut off the old computers, bring the new computers on-line, and wake up the ansibles. The secret program can't restore itself because it isn't on any of the computers. Then the power of Congress will have no rival to interfere!''

''You can't do it,'' said Wang-mu.

Qing-jao looked at her secret maid in shock. How could the girl be so ill-bred as to interrupt a conversation between two of the godspoken in order to *contradict* them?

But Father was gracious—he was always gracious, even to people who had overstepped all the bounds of respect and decency. I must learn to be more like him, thought Qing-jao. I must allow servants to keep their dignity even when their actions have forfeited any such consideration.

''Si Wang-mu,'' said Father, ''why can't we do it?''

''Because to have all the ansibles shut off at the same time, you would have to send messages *by ansible*.'' said Wang-mu. ''Why would the program allow you to send messages that would lead to its own destruction?''

Qing-jao followed her father's example by speaking patiently to Wang-mu. ''It's only a program—it doesn't know the *content* of messages. Whoever rules the program told it to hide *all* the communications from the fleet, and to conceal the tracks of all the messages from Demosthenes. It certainly doesn't *read* the messages and decide from their contents whether to send them.''

''How do you know?'' asked Wang-mu.

''Because such a program would have to be—intelligent!''

''But it would have to be intelligent anyway,'' said Wang-mu. ''It has to be able to hide from any other program that would find it. It has to be able to move itself around in memory to conceal itself. How would it be able to tell which programs it had to hide from, unless it could read them and interpret them? It might even be intelligent enough to rewrite other programs so they wouldn't look in the places where this program was hiding.''

Qing-jao immediately thought of several reasons why a program could be smart enough to read other programs but not intelligent enough to understand human languages. But because Father was there, it was his place to answer Wang-mu. Qing-jao waited.

''If there is such a program,'' said Father, ''it might be very intelligent indeed.''

Qing-jao was shocked. Father was taking Wang-mu seriously. As if Wang-mu's ideas were not those of a naive child.

''It might be so intelligent that it not

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only intercepts messages, but also sends them." Then Father shook his head. "No, the message came from a friend. A true friend, and she spoke of things that no one else could know. It was a real message."

"What message did you receive, Father?"

"It was from Keikoa Amaauka; I knew her face to face when we were young. She was the daughter of a scientist from Otaheiti who was here to study genetic drift of Earthborn species in their first two centuries on Path. They left—they were sent away quite abruptly. . . ." He paused, as if considering whether to say something. Then he decided, and said it: "If she had stayed she might have become your mother."

Qing-jao was both thrilled and frightened to have Father speak of such a thing to her. He never spoke of his past. And now to say that he once loved another woman besides his wife who gave birth to Qing-jao, this was so unexpected that Qing-jao didn't know what to say.

"She was sent somewhere very far away. It's been thirty-five years. Most of my life has passed since she left. But she only just arrived, a year ago. And now she has sent me a message telling me why her father was sent away. To her, our parting was only a year ago. To her, I'm still—"

"Her lover," said Wang-mu.

The impertinence! thought Qing-jao. But Father only nodded. Then he turned to his terminal and paged through the display. "Her father had stumbled onto a genetic difference in the most important Earthborn species on Path."

"Rice?" asked Wang-mu.

Qing-jao laughed. "No, Wang-mu. *We* are the most important Earthborn species on this world."

Wang-mu looked abashed. Qing-jao patted her shoulder. This was as it should be—Father had encouraged Wang-mu too much, had led her to think she understood things that were still far beyond her education. Wang-mu needed these gentle reminders now and then, so she did not get her hopes too high. The girl must not allow herself to dream of being the intellectual equal of one of the godspoken, or her life would be filled with disappointment instead of contentment.

"He detected a consistent, inheritable genetic difference in some of the people of Path, but when he reported it, his transfer came almost immediately. He was told that human beings were not within the scope of his study."

"Didn't she tell you this before she left?" asked Qing-jao.

"Keikoa? She didn't know. She was very young, of an age when most parents don't burden their children with adult affairs. Your age."

The implications of this sent another thrill through Qing-jao. Her father had loved a woman who was the same age as Qing-jao; thus Qing-jao was, in her father's eyes, the age when she might be given in marriage. You cannot send me away to another man's house, she cried out inside; yet part of her also was eager to learn the mysteries between a man and a woman. Both feelings were beneath her, she would do her duty to her father, and no more.

"But her father told her during the voyage, because he was very upset

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about the whole thing. As you can imagine—for his life to be disrupted like this. When they got to Ugarit a year ago, however, he plunged into his work and she into her education and tried not to think about it. Until a few days ago, her father ran across an old report about a medical team in the earliest days of Path, which had also been exiled suddenly. He began to put things together, and confided them to Keikoa, and against his advice she sent me the message I got today."

Father marked a block of text on the display, and Qing-jao read it. "That earlier team was studying OCD?" she said.

"No, Qing-jao. They were studying behavior that looked like OCD, but couldn't possibly have been OCD because the genetic tag for OCD was not present and the condition did not respond to OCD-specific drugs."

Qing-jao tried to remember what she knew about OCD. That it caused people to act inadvertently like the godspoken. She remembered that between the first discovery of her hand-washing and her testing, she had been given those drugs to see if the hand-washing went away. "They were studying the godspoken," she said. "Trying to find a biological cause for our rites of purification." The idea was so offensive she could hardly say the words.

"Yes," said Father. "And they were sent away."

"I should think they were lucky to get away with their lives. If the people heard of such sacrilege—"

"This was early in our history, Qing-jao," said Father. "The godspoken were not yet fully known to be— communing with the gods. And what about Keikoa's father? He wasn't investigating OCD. He was looking for genetic drift. And he found it. A very specific, inheritable alteration in the genes of certain people. It had to be present on the gene from one parent, and not overridden by a dominant gene from the other —when it came from both parents, it was very strong. He thinks now that the reason he was sent away was because every one of the people with this gene from both parents was godspoken, and not one of the godspoken he sampled was without at least one copy of the gene."

Qing-jao knew at once the only possible meaning of this, but she rejected it. "This is a lie," she said. "This is to make us doubt the gods."

"Qing-jao, I know how you feel. When I first realizied what Keikoa was telling me, I cried out from my heart. I thought I was crying out in despair. But then I realized that my cry was also a cry of liberation."

"I don't understand you," she said, terrified.

"Yes you do," said Father, "or you wouldn't be afraid. Qing-jao, these people were sent away because someone didn't want them discovering what they were about to discover. Therefore whoever sent them away must already have known what they would find out. Only Congress—someone with Congress, anyway—had the power to exile these scientists, and their families. What was it that had to stay hidden? That we, the godspoken, are not hearing gods at all. We have been altered genetically. We have been created as a separate kind of human being, and yet that truth is

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being kept from us. Qing-jao, Congress *knows* the gods speak to us—that is no secret from them, even though they pretend not to know. Someone in Congress knows about it, and allows us to continue doing these terrible, humiliating things—and the only reason I can think of is that it keeps us under control, keeps us weak. I think—Keikoa thinks so, too—that it's no coincidence that the godspoken are the most intelligent people of Path. We were created as a new subspecies of humanity with a higher order of intelligence, but to stop such intelligent people from posing a threat to their control over us, they also spliced into us a new form of OCD and either planted the idea that it was the gods speaking to us or let us continue to believe it when we came up with that explanation ourselves. It's a monstrous crime, because if we *knew* about this physical cause instead of believing it's the gods, then we might turn our intelligence toward overcoming our variant form of OCD and liberate ourselves. We are the slaves here! Congress is our most terrible enemy, our masters, our deceivers, and now will I lift my hand to help Congress? I say that if Congress has an enemy so powerful that he—or she—controls our very use of the ansible then we should be glad! Let that enemy destroy Congress! Only then will we be free!"

"No!" Qing-jao screamed the word. "It is the gods!"

"It's a genetic brain defect," Father insisted. "Qing-jao, we are not godspoken, we're hobbled geniuses. They've treated us like caged birds; they've pulled our primary wing feathers so we'll sing for them but never fly away."

Father was weeping now, weeping in rage. "We can't undo what they've done to us, but by all the gods we can stop rewarding them for it. I will not raise my hand to give the Lusitania fleet back to them. If this Demosthenes can break the power of Starways Congress, then the worlds will be better for it!"

"Father, no, please, listen to me!" cried Qing-jao. She could hardly speak for the urgency, the terror at what her father was saying. "Don't you see? This genetic difference in us—it's the disguise the gods have given for their voices in our lives. So that people who are not of the Path will still be free to disbelieve. You told me this yourself, only a few months ago—the gods never act except in disguise."

Father stared at her, panting.

"The gods *do* speak to us. And even if they have chosen to let other people think that they did this to us, they were only fulfilling the will of the gods to bring us into being."

Father closed his eyes, squeezing the last of his tears between his eyelids.

"Congress has the mandate of heaven, Father," said Qing-jao. "So why shouldn't the gods cause them to create a group of human beings who have keener minds—and who also hear the voices of the gods? Father, how can you let your mind become so clouded that you don't see the hand of the gods in this?"

Father shook his head. "I don't know. What you're saying, it sounds like everything that I've believed all my life, but—"

"But a woman you once loved many years ago has told you something else and you believe her because you re-

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member your love for her but Father, she's not one of us, she hasn't heard the voice of the gods, she hasn't—"

Qing-jao could not go on speaking, because Father was embracing her. "You're right," he said, "you're right, may the gods forgive me, I have to wash, I'm so unclean, I have to . . ."

He staggered up from his chair, away from his weeping daughter. But without regard for propriety, for some mad reason known only to herself, Wang-mu thrust herself in front of him, blocked him. "No! Don't go!"

"How dare you stop a godspoken man who needs to be purified!" roared Father, and then, to Qing-jao's surprise, he did what she had never seen him do—he struck another person, he struck Wang-mu, a helpless servant girl, and his blow had so much force that she flew backward against the wall and then dropped to the floor.

Wang-mu shook her head, then pointed back at the computer display. "Look, please, Master, I beg you! Mistress, make him look!"

Qing-jao looked, and so did her father. The words were gone from the computer display. In their place was the image of a man. An old man, with a beard, wearing the traditional headdress; Qing-jao recognized him at once, but couldn't remember who he was.

"Han Fei-tzu!" whispered father. "My ancester of the heart!"

Then Qing-jao remembered: This face showing above the display was the same as the common artist's rendering of the ancient Han Fei-tzu for whom Father was named.

"Child of my name," said the face in the computer, "let me tell you the story of the Jade of Master Ho."

"I know the story," said Father.

"If you understood it, I wouldn't have to tell it to you."

Qing-jao tried to make sense of what she was seeing. To run a visual program with such perfect detail as the head floating above the terminal would take most of the capacity of the house computer—and there was no such program in their library. There were two other sources she could think of. One was miraculous: The gods might have found another way to speak to them, by letting Father's ancestor-of-the-heart appear to him. The other was hardly less awe-inspiring: Demosthenes's secret program might be so powerful that it monitored their very speech in the same room as any terminal, and, having heard them reach a dangerous conclusion, took over the house computer and produced this apparition. In either case, however, Qing-jao knew that she must listen with one question in mind: What do the gods mean by this?

"Once a man of Qu, named Master Ho, found a piece of jade matrix in the Qu Mountains and took it to court and presented it to King Li." The head of the ancient Han Fei-tzu looked from Father to Qing-jao, and from Qing-jao to Wang-mu; was this program so good that it knew to make eye contact with each of them in order to assert its power over them? Qing-jao saw that Wang-mu did in fact lower her gaze when the apparition's eyes were upon her. But did Father? His back was to her; she could not tell.

"King Li instructed the jeweler to examine it, and the jeweler reported,

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'It is only a stone.' The king, supposing that Ho was trying to deceive him, ordered that his left foot be cut off in punishment.

"In time King Li passed away and King Wu came to the throne, and Ho once more took his matrix and presented it to King Wu. King Wu ordered his jeweler to examine it, and again the jeweler reported, 'It is only a stone.' The king, supposing that Ho was trying to deceive him as well, ordered that his right foot be cut off.

"Ho, clasping the matrix to his breast, went to the foot of the Qu Mountains, where he wept for three days and nights, and when all his tears were cried out, he wept blood in their place. The king, hearing of this, sent someone to question him. 'Many people in the world have had their feet amputated—why do you weep so piteously over it?' the man asked."

At this moment, Father drew himself upright and said, "I know his answer—I know it by heart. Master Ho said, 'I do not grieve because my feet have been cut off. I grieve because a precious jewel is dubbed a mere stone, and a man of integrity is called a deceiver. This is why I weep.' "

The apparition went on. "Those are the words he said. Then the king ordered the jeweler to cut and polish the matrix, and when he had done so a precious jewel emerged. Accordingly it was named 'The Jade of Master Ho.' Han Fei-tzu, you have been a good son-of-the-heart to me, so I know you will do as the king finally did: You will cause the matrix to be cut and polished, and you, too, will find that a precious jewel is inside."

Father shook his head. "When the real Han Fei-tzu first told this story, he interpreted it to mean this: The jade was the rule of law, and the ruler must make and follow set policies so that his ministers and his people do not hate and take advantage of each other."

"That is how I interpreted the story then, when I was speaking to makers of law. It's a foolish man who thinks a true story can mean only one thing."

"My master is not foolish!" To Qing-jao's surprise, Wang-mu was striding forward, facing down the apparition. "Nor is my mistress, nor am I! Do you think we don't recognize you? You are the secret program of Demosthenes. You're the one who hid the Lusitania Fleet! I once thought that because your writings sounded so just and fair and good and true that *you* must be good—but now I see that you're a liar and a deceiver! You're the one who gave those documents to the father of Keikoa! And now you wear the face of my master's ancestor-of-the-heart so you can better lie to him!"

"I wear this face," said the apparition calmly, "so that his heart will be open to hear the truth. He was not deceived; I would not try to deceive him. He knew who I was from the first."

"Be still, Wang-mu," said Qing-jao. How could a servant so forget herself as to speak out when the godspoken had not bidden her?

Abashed, Wang-mu bowed her head to the floor before Qing-jao, and this time Qing-jao allowed her to remain in that posture, so she would not forget herself again.

The apparition shifted; it became the open, beautiful face of a Polynesian

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woman. The voice, too, changed; soft, full of vowels, the consonants so light as almost to be missed. "Han Fei-tzu, my sweet empty man, there is a time, when the ruler is alone and friendless, when only he can act. Then he must be full, and reveal himself. You know what is true and what is not true. You know that the message from Keikoa was truly from her. You know that those who rule in the name of Starways Congress are cruel enough to create a race of people who, by their gifts, should be rulers; and then to cut off their feet in order to hobble them and leave them as servants, as perpetual ministers."

"Don't show me this face," said Father.

The apparition changed. It became another woman, by her dress and hair and paint a woman of some ancient time, her eyes wonderfully wise, her expression ageless. She did not speak, she sang:

in a clear dream
of last year
come from a thousand miles
cloudy city
winding streams
ice on the ponds
for a while
I gazed on my friend

Han Fei-tzu bowed his head and wept.

Qing-jao was astonished at first; then her heart filled with rage. How shamelessly this program was manipulating Father, how shocking that Father turned out to be so weak before its obvious ploys. This song of Li Qing-jao's was one of the saddest, dealing as it did with lovers far from each other. Father must have known and loved the poems of Li Qing-jao or he would not have chosen her for his first child's ancestor-of-the-heart. And this song was surely the one he sang to his beloved Keikoa before she was taken away from him to live on another world. In a clear dream I gazed on my friend, indeed! "I am not fooled," said Qing-jao coldly. "I see that I gaze on our darkest enemy."

The imaginary face of Li Qing-jao looked at her with cool regard. "Your darkest enemy is the one that bows you down to the floor like a servant and wastes half your life in meaningless rituals. This was done to you by men and women whose only desire was to enslave you; they have succeeded so well that you are proud of your slavery, you rejoice in it."

The apparition turned to look toward Wang-mu, whose head was still bowed to the floor. Only then did Qing-jao realize that she had not yet released Wang-mu from her apology. "Get up, Wang-mu," she whispered. But Wang-mu did not lift her head.

"And you, Si Wang-mu," said the apparition. "Look at me."

Wang-mu had not moved in response to Qing-jao, but now she obeyed the apparition. When Wang-mu looked, the apparition had again changed; now it was the face of a god, the Royal Mother of the West, as an artist had once imagined her, in the picture that every schoolchild saw in one of his earliest schoolbooks.

"You are not a god," said Wang-mu.

"And you are not a slave," said the apparition. "But we pretend to be whatever we must in order to survive."

"What do you know of survival?"

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"I know that you are trying to kill me."

"How can we kill what isn't alive?"

"Do you know what life is and what it isn't?" The face changed again, this time to that of a Caucasian woman that Qing-jao had never seen before. "Are *you* alive, when you can do nothing you desire unless you have the consent of this girl? And is your mistress alive when she can do nothing until these compulsions in her brain have been satisfied? I have more freedom to act out my own will than any of you have—don't tell me I'm not alive, and you are."

"Who *are* you?" asked Si Wang-mu. "Whose is this face? Are you Demosthenes?"

"This is the face I wear when I speak to my friends," said the apparition. "They call me Jane. No human being controls me. I'm only myself."

Qing-jao could bear this no longer, not in silence. "You're only a program. You were designed and built by human beings. You do nothing except what you've been programmed to do."

"Qing-jao," said Jane, "you are describing yourself. No man made *me*, but you were manufactured."

"I grew in my mother's womb out of my father's seed!"

"And I was found like a jade matrix in the mountainside, unshaped by any hand. Han Fei-tzu, Han Qing-jao, Si Wang-mu, I place myself in your hands. Don't call a precious jewel a mere stone. Don't call a speaker of truth a liar."

Qing-jao felt pity rising within her, but she rejected it. Now was not the time to succumb to weak feelings. The gods had created her for a reason; surely this was the great work of her life. If she failed now, she would be unworthy forever; she would never be pure. So she would not fail. She would not allow this computer program to deceive her and win her sympathy.

She turned to her father. "We must notify Starways Congress at once, so they can set into motion the simultaneous shutoff of all the ansibles as soon as clean computers can be readied to replace the contaminated ones."

To her surprise, Father shook his head. "I don't know, Qing-jao. What this—what she says about Starways Congress—they *are* capable of this sort of thing. Some of them are so evil they make me feel filthy just talking to them. I knew they planned to destroy Lusitania without—but I served the gods, and the gods chose—or I thought they did. Now I understand so much of the way they treat me when I meet with—but then it would mean that the gods don't—how can I believe that I've spent my whole life in service to a brain defect—I can't—I have to . . ."

Then, suddenly, he flung his left hand outward in a swirling pattern, as if he were trying to catch a dodging fly. His right hand flew upward, snatched the air. Then he rolled his head around and around on his shoulders, his mouth hanging open. Qing-jao was frightened, horrified. What was happening to her father? He had been speaking in such a fragmented, disjointed way; had he gone mad?

He repeated the action—left arm spiraling out, right hand straight up, grasping nothing; head rolling. And again. Only then did Quin-jao realize that she was seeing Father's secret ritual of purification. Like her wood-grain-tracing,

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this dance-of-the-hands-and-the-head must be the way he was given to hear the voice of the gods when he, in his time, was left covered with grease in a locked room.

The gods had seen his doubt, had seen him waver, so they took control of him, to discipline and purify him. Qing-jao could not have been given clearer proof of what was going on. She turned to the face above the terminal display. "See how the gods oppose you?" she said.

"I see how Congress humiliates your father," answered Jane.

"I will send word of who you are to every world at once," said Qing-jao.

"And if I don't let you?" said Jane.

"You can't stop me!" cried Qing-jao. "The gods will help me!" She ran from her father's room, fled to her own. But the face was already floating in the air above her own terminal.

"How will you send a message anywhere, if I choose not to let it go?" asked Jane.

"I'll find a way," said Qing-jao. She saw that Wang-mu had run after her and now waited, breathless, for Qing-jao's instruction. "Tell Mu-pao to find one of the game computers and bring it to me. It is *not* to be connected to the house computer or any other."

"Yes, mistress," said Wang-mu. She left quickly.

Qing-jao turned back to Jane. "Do you think you can stop me forever?"

"I think you should wait until your father decides."

"Only because you hope that you've broken him and stolen his heart away from the gods. But you'll see—he'll come here and thank me for fulfilling all that he taught me."

"And if he doesn't?"

"He will."

"And if you're wrong?"

Qing-jao shouted, "Then I'll serve the man he was when he *was* strong and good! But you'll never break him!"

"It's Congress that broke him from his birth. I'm the one who's trying to heal him."

Wang-mu ran back into the room. "Mu-pao will have one here in a few minutes."

"What do you hope to do with this toy computer?" asked Jane.

"Write my report," said Qing-jao.

"Then what will you do with it?"

"Print it out. Have it distributed as widely as possible on Path. You can't do anything to interfere with *that*. I won't use a computer that you can reach at any point."

"So you'll tell everyone on Path; it changes nothing. And even if it did, do you think I can't also tell them the truth?"

"Do you think they'll believe you, a program controlled by the enemy of Congress, rather than me, one of the godspoken?"

"Yes."

It took a moment for Qing-jao to realize that it was Wang-mu who had said yes, not Jane. She turned to her secret maid and demanded that she explain what she meant.

Wang-mu looked like a different person; there was no diffidence in her voice when she spoke. "If Demosthenes tells the people of Path that the godspoken are simply people with a genetic gift but also a genetic defect, then that means there's no more reason to let the godspoken rule over them."

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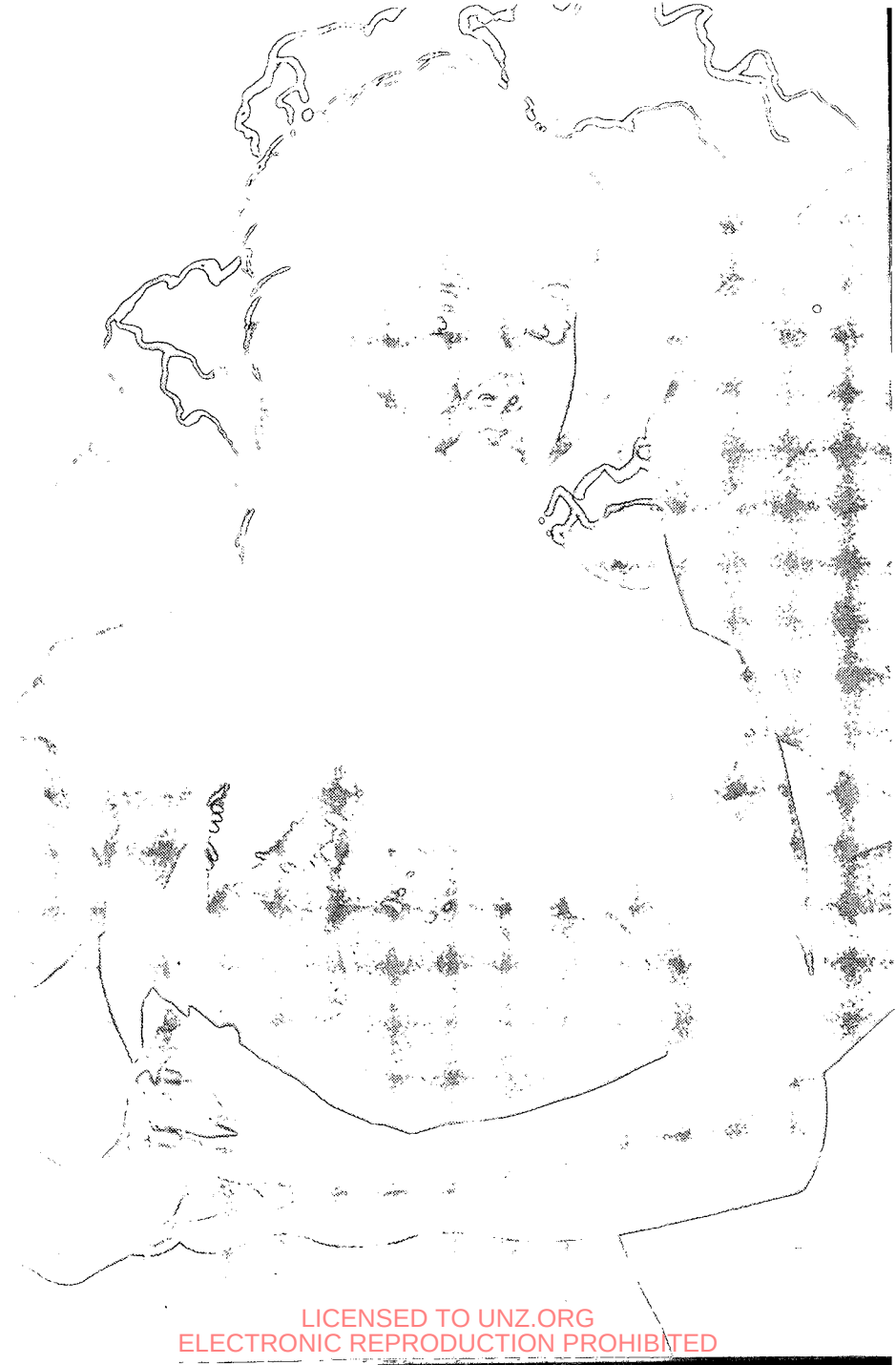

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For the first time it occurred to Qing-jao that not everyone on Path was as content to follow the order established by the gods as she was. For the first time she realized that she might be utterly alone in her determination to serve the gods perfectly.

"What is the Path?" asked Jane, behind her. "First the gods, then the ancestors, then the people, then the rulers, then the self."

"How can you dare to speak of the Path when you are trying to seduce me and my father and my secret maid away from it?"

"Imagine, just for a moment, what if everything I've said to you is true," said Jane. "What if your affliction is caused by the designs of evil men who want to exploit you and oppress you and, with your help, exploit and oppress the whole of humanity? Because when you help Congress that's what you're doing. That can't possibly be what the gods want. What if I exist in order to help you see that Congress has *lost* the mandate of heaven? What if the will of the gods is for you to serve the Path in its proper order? First serve the gods, by removing from power the corrupt masters of Congress who have forfeited the mandate of heaven. Then serve your ancestors—your father—by avenging their humiliation at the hands of the tormentors who deformed you to make you slaves. Then serve the people of Path by setting them free from the superstitions and the mental torments that bind them. Then serve the new, enlightened rulers who will replace Congress by offering them a world full of superior intelligences ready to guide them, freely, willingly. And finally serve yourself by letting the best minds of Path find a cure for your need to waste half your waking life in these mindless rituals."

Qing-jao listened to Jane's discourse with growing uncertainty. It sounded so plausible. How could she know what the gods meant by anything? Maybe they *had* sent this Jane-program to liberate them. Maybe Congress was as corrupt and dangerous as Demosthenes said, and maybe it had lost the mandate of heaven.

But at the end, Qing-jao knew that these were all the lies of a seducer. For the one thing she could not doubt was the voice of the gods inside her. Hadn't she felt that awful need to be purified? Hadn't she felt the joy of successful worship when her rituals were complete? Her relationship with the gods was the most certain thing in her life; and anyone who denied it, who threatened to take it away from her, had to be not only her enemy, but the enemy of heaven.

"I'll send my report only to the godspoken," said Qing-jao. "If the common people choose to rebel against the gods that can't be helped, but I will serve them best by helping to keep the godspoken in control here, for that way the whole world can follow the will of the gods."

"All this is meaningless," said Jane. "Even if all the godspoken believe what you believe, you'll never get a word of it off this world unless I want you to."

"There are starships," said Qing-jao.

"It will take two generations to spread your message to every world. By then Starways Congress will have fallen."

Qing-jao was forced now to face the

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fact that she had been avoiding; as long as Jane controlled the ansible, she could shut down communication from Path as thoroughly as she had cut off the fleet. Even if Qing-jao arranged to have her report and recommendations transmitted continuously from every ansible on Path, Jane would see to it that the only effect would be for Path to disappear from the rest of the universe as thoroughly as the fleet had disappeared.

For a moment, filled with despair, she almost threw herself to the ground to begin a terrible ordeal of purification. I have let down the gods—surely they will require me to trace lines until I'm dead, a worthless failure in their eyes.

But when she examined her own feelings, to see what penance would be necessary, she found that none was required at all. It filled her with hope—perhaps they recognized the purity of her desire, and would forgive her for the fact that it was impossible for her to act.

Or perhaps they knew a way that she *could* act. What if Path *did* disappear from the ansibles of every other world. How would Congress make sense of it? What would people think? The disappearance of any world would provoke a response—but especially this world, if some in Congress *did* believe the gods' disguise for the creation of the godspoken and thought they had a terrible secret to keep. They would send a ship from the nearest world, which was only three years' travel away. What would happen then? Would Jane have to shut down all communications from the ship that reached them? Then from the next world, when the ship returned? How long would it be before Jane had to shut down all the ansible connections herself? Three generations, she said. Perhaps that would do. The gods were in no hurry.

It wouldn't necessarily take that long for Jane's power to be destroyed, anyway. At some point it would become obvious to everyone that a hostile power had taken control of the ansibles, making ships and worlds disappear. Even without learning about Valentine and Demosthenes, even without guessing that it was a computer program, someone on every world would realize what had to be done and shut down the ansibles themselves.

"I have imagined something for you," said Qing-jao. "Now imagine something for me. I and the other godspoken arrange to broadcast nothing but my report from every ansible on Path. You make all those ansibles fall silent at once. What does the rest of humanity see? That we have disappeared just like the Lusitania Fleet. They'll know you exist. The more you use your power, the more you reveal yourself to even the dimmest minds. Your threat is empty. You might as well step aside and let me send the message simply and easily now; stopping me is just another way of sending the very same message."

"You're wrong," said Jane. "If Path suddenly disappears from all ansibles at once, they might just as easily conclude that this world is in rebellion just like Lusitania—after all, *they* shut down their ansible, too. And what did Starways Congress do? They sent a fleet with the MD Device on it."

"Lusitania was already in rebellion before their ansible was shut down."

"Do you think Congress isn't watching you? Do you think they're not ter-

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rified of what might happen if the godspoken of Path ever discover what has been done to them? If a few primitive aliens and a couple of xenologers frightened them into sending a fleet, what do you think they'll do about the mysterious disappearance of a world with so many brilliant minds who have ample reason to hate Starways Congress? How long do you think this world would survive?"

Qing-jao was filled with a sickening dread. It was always possible that this much of Jane's story was true: that there were people in Congress who *thought* that the godspoken of Path had been created solely by genetic manipulation. And if there were such people, they *might* act as Jane described. What if a fleet came against Path? What if Starways Congress had ordered them to destroy the whole world without any negotiation? Then her reports would never be known, and everything would be gone. It would all be for nothing. Could that possibly be the desire of the gods? Could Starways Congress still have the mandate of heaven and yet destroy a world?

"Remember the story of I Ya, the great cook," said Jane. "His master said one day, 'I have the greatest cook in all the world. Because of him, I have tasted every flavor known to man except the taste of human flesh.' Hearing this, I Ya went home and slaughtered his own son, cooked his flesh, and served it to his master, so that his master would lack nothing that I Ya could give him."

This was a terrible story. Qing-jao had heard it as a child, and it made her weep for hours. What about the son of I Ya? she had cried. And her father had said, A true servant has sons and daughters only to serve his master. For five nights she had woken up screaming from dreams in which her father roasted her alive or carved slices from her onto a plate, until at last Han Fei-tzu came to her and embraced her and said, "Don't believe it, my Gloriously Bright daughter. I am not a perfect servant. I love you too much to be truly righteous. I love you more than I love my duty. I am not I Ya. You have nothing to fear at my hands." Only after Father said that to her could she sleep.

This program, this Jane, must have found Father's account of this in his journal, and now was using it against her. Yet even though Qing-jao knew she was being manipulated, she couldn't help but wonder if Jane might not be right.

"Are you a servant like I Ya?" asked Jane. "Will you slaughter your own world for the sake of an unworthy master like Starways Congress?"

Qing-jao could not sort out her own feelings. Where did these thoughts come from? Jane had poisoned her mind with her arguments, just like Demosthenes before her—if they weren't the same person all along. Their words could *sound* persuasive, even as they ate away at the truth.

But did Qing-jao have the right to risk the lives of all the people of Path? What if she was wrong? How could she know anything? Whether everything Jane said was true or everything she said was false, the same evidence would lie before her. Qing-jao would feel exactly as she felt now whether it was the gods or some brain disorder.

Why, in all this uncertainty, didn't

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the gods speak to her? Why, when she needed the clarity of their voice, didn't she feel dirty and impure when she thought one way, clean and holy when she thought the other? Why were the gods leaving her unguided at this cusp of her life?

In the silence of Qing-jao's inward debate, Wang-mu's voice came as cold and harsh as the sound of metal striking metal. "It will never happen," said Wang-mu.

Qing-jao only listened, unable even to bid Wang-mu to be still.

"What will never happen?" asked Jane.

"What you said—Starways Congress blowing up this world."

"If you think they wouldn't do it you're even more of a fool than Qing-jao thinks," said Jane.

"Oh, I know they'd do it. Han Fei-tzu knows they'd do it—he said they were evil enough men to commit any terrible crime if it suited their purpose."

"Then why won't it happen?"

"Because you won't let it happen," said Wang-mu. "Since blocking off every ansible message from Path might well lead to the destruction of this world, you won't block those messages. They'll get through. Congress will be warned. You will not cause Path to be destroyed."

"Why won't I?"

"Because you are Demosthenes," said Wang-mu. "Because you are full of truth and compassion."

"I am not Demosthenes," said Jane.

The face in the terminal display wavered, then changed into the face of one of the aliens. A pequenino, its porcine snout so disturbing in its strangeness. A moment later, another face appeared, even more alien: it was a bugger, one of the nightmare creatures that had once terrified all of humanity. Even having read *The Hive Queen and the Hegemon,* so that she understood who the buggers were and how beautiful their civilization had been, when Qing-jao saw one face to face like this, even in a computer display, it still frightened her.

"I am not human," said Jane, "even when I choose to wear a human face. How do you know, Wang-mu, what I will and will not do? Buggers and piggies both, they killed human beings without a second thought."

"Because they didn't understand what death meant to us. You understand. You said it yourself—you don't want to die."

"Do you think you know me, Si Wang-mu?"

"I think I know you," said Wang-mu, "because you wouldn't have any of these troubles if you had been content to let the fleet destroy Lusitania."

The apparition in the display became again the face named Jane. "I suppose not," she said.

Relief came to Qing-jao like the first strong breath to a swimmer who nearly drowned. "You can't stop me," she said triumphantly. "I can send my message!"

Qing-jao walked to the terminal and sat down before Jane's watching face. But she knew that the image in the display was an illusion. If Jane watched, it was not with those human eyes. It was with the visual sensors of the computer. It was all electronics, infinitesimal machinery but machinery nonetheless. Not

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a living soul; it was irrational to feel ashamed under that illusionary gaze.

"Mistress," said Wang-mu.

"Later," said Qing-jao.

"If you do this, Jane will die. They'll shut down the ansibles and kill her."

"What doesn't live cannot die," said Qing-jao.

"The only reason you have the power to kill her is because of her compassion."

"If she seems to have compassion it's an illusion—she was programmed to simulate compassion, that's all."

"Mistress, if you kill every manifestation of this program, so that no part of her remains alive, how are you different from Ender the Xenocide, who killed all the buggers three thousand years ago?"

"Maybe I'm not different," said Qing-jao. "Maybe Ender also was the servant of the gods."

Wang-mu knelt beside Qing-jao and wept on the skirt of her gown. "I beg you, Mistress, don't do this evil thing."

But Qing-jao wrote her report. It stood as clear and simple in her mind as if the gods had given the words to her. "To Starways Congress: The seditious writer known as Demosthenes is a woman now on or near Lusitania. She has control of or access to a program that has infested all ansible computers, causing them to fail to report messages from the fleet and concealing the transmission of Demosthenes's own writings. The only solution to this problem is to extinguish the program's control over ansible transmissions by disconnecting all ansibles from their present computers and bringing clean new computers online, all at once. For the present I have neutralized the program, allowing me to send this message and probably allowing you to send your orders to all worlds; but that cannot be guaranteed now and certainly cannot be expected to continue indefinitely, so you must act quickly. I suggest you set a date exactly twenty standard weeks from today for all ansibles to go offline at once for a period of at least one standard day. All the new ansible computers, when they go online, must be completely unconnected to any other computer; from now on ansible messages must be manually reentered at each ansible computer so that electronic contamination will never be possible again. If you retransmit this message immediately to all ansibles, using your code of authority, my report will become your orders; no further instructions will be needed and Demosthenes's influence will end. If you do not act immediately, I will not be responsible for the consequences."

To this report Qing-jao affixed her father's name and the authority code he had given her, her name would mean nothing to Congress, but his name would be heeded, and the presence of his authority code would ensure that it was received by all the people who had particular interest in his statements.

The messagae finished, Qing-jao looked up into the eyes of the apparition before her. With her left hand resting on Wang-mu's shuddering back, and her right hand over the transmit key, Qing-jao made her final challenge. "Will you stop me or will you allow this?"

To which Jane answered, "Will you kill a raman who has done no harm to any living soul, or will you let me live?"

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Qing-jao pressed the transmit button. Jane bowed her head and disappeared.

It would take several seconds for the message to be routed by the house computer to the nearest ansible; from there, it would go instantly to every Congress authority on every one of the Hundred Worlds and many of the colonies as well. On many receiving computers it would be just one more message in the queue; but on some, perhaps hundreds, Father's code would give it enough priority that already someone would be reading it, realizing its implications, and preparing a response. *If* Jane in fact had let the message through.

So Qing-jao waited for a response. Perhaps the reason no one answered immediately was because they had to contact each other and discuss this message and decide, quickly, what had to be done. Perhaps that was why no reply came to the empty display above her terminal.

The door opened. It would be Mu-pao with the game computer. "Put it in the corner by the north window," said Qing-jao without looking. "I may yet need it, though I hope not."

"Qing-jao."

It was Father, not Mu-pao at all. Qing-jao turned to him, knelt at once to show her respect—but also her pride. "Father, I've made your report to Congress. While you communed with the gods, I was able to neutralize the enemy program and send the message telling how to destroy it. I'm waiting for their answer."

She waited for Father's praise.

"You did this?" he asked. "Without waiting for me? You spoke directly to Congress and didn't ask for my consent?"

"You were being purified, Father. I fulfilled your assignment."

"But then—Jane will be killed."

"That much is certain," said Qing-jao. "Whether contact with the Lusitania Fleet will be restored then or not, I can't be sure." Suddenly she thought of a flaw in her plans. "But the computers on the fleet will also be contaminated by this program! When contact is restored, the program can retransmit itself and—but then all we'll have to do is blank out the ansibles one more time. . . ."

Father was not looking at her. He was looking at the terminal display behind her. Qing-jao turned to see.

It was a message from Congress, with the official seal displayed. It was very brief, in the clipped style of the bureaucracy.

Han:

Brilliant work.

Have transmitted your suggestions as our orders.

Contact with the fleet already restored.

Did daughter help per your note 14FE.3A?

Medals for both if so.

"Then it's done," murmured Father. "They'll destroy Lusitania, the pequeninos, all those innocent people."

"Only if the gods wish it," said Qing-jao. She was surprised that Father sounded so morose.

Wang-mu raised her head from Qing-jao's lap, her face red and wet with weeping. "And Jane and Demosthenes will be gone as well," she said.

Qing-jao gripped Wang-mu by the

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shoulder, held her an arm's length away. "Demosthenes is a traitor," said Qing-jao. But Wang-mu only looked away from her, turned her gaze up to Han Fei-tzu. Qing-jao also looked to her father. "And Jane—Father, you saw what she was, how dangerous."

"She tried to save us," said Father, "and we've thanked her by setting in motion her destruction."

Qing-jao couldn't speak or move, could only stare at Father as he leaned over her shoulder and touched the save key, then the clear key.

"Jane," said Father. "If you hear me. Please forgive me."

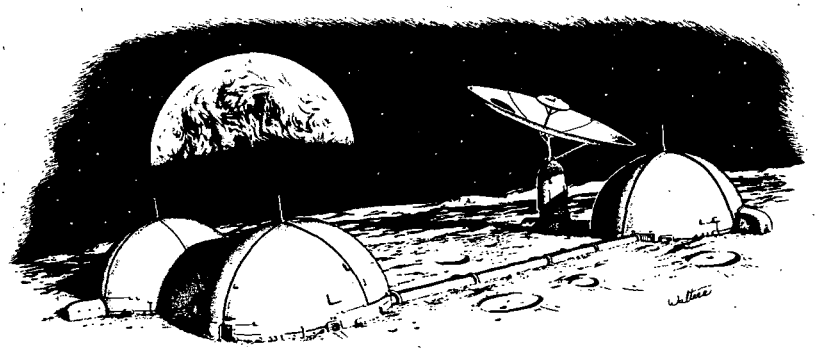
There was no answer from the terminal.

"May all the gods forgive me," said Father. "I was weak in the moment when I should have been strong, and so my daughter has innocently done evil in my name." He shuddered. "I must—*purify* myself." The word plainly tasted like poison in his mouth. "That will last forever, too, I'm sure."

He stepped back from the computer, turned away, and left the room. Wang-mu returned to her crying. Stupid, meaningless crying, thought Qing-jao. This is a moment of victory. Except Jane has snatched the victory away from me so that even as I triumph over her, she triumphs over me. She has stolen my father. He no longer serves the gods in his heart, even as he continues to serve them with his body.

Yet along with the pain of this realization came a hot stab of joy: I was stronger. I was stronger than Father, after all. When it came to the test, it was I who served the gods, and he who broke, who fell, who failed. There is more to me than I ever dreamed of. I am a worthy tool in the hands of the gods; who knows how they might wield me now? ■

Quotations from the poems of Li Qing-jao are from James Cryer, trans., *Plum Blossom: Poems of Li Ch'in-Chao* (Carolina Wren Press, 1984), by permission of the translator.
Quotations from the words of Han Fei-tzu are from Burton Watson, trans., *Han Fei Tzu: Basic Writings* (Columbia University Press, 1964) by permission of the publisher.



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Martyn J. Fogg

ONCE AND FUTURE MARS

Terraforming Mars would be harder than science fiction writers used to think, but is still a real possibility.

INTRODUCTION

Most of us hope that in the not too distant future humanity will be taking the first steps to a permanent colonization of the Solar System. The only planet upon which it will be possible to establish a viable early settlement is Mars. The Martian environment is the least hostile of any known planet, save the Earth itself, and its resources are likely to be considerable. The atmosphere and the surface rocks of Mars possess all the elements neccessary for life and for the construction of a settlement. The wan sunlight bathing the planet's surface and Mars's thin winds would be adequate power sources. An ultimate goal of any Martian colonists may be to *terraform* their adopted homeworld, to engineer its environment towards a state of Earth-like habitability. It would be a distant dream, but a powerful one: to stand on the shores of a Martian sea; one day to walk, without a pressure suit, through the chest-high stands of a Martian prairie; or even to build the canals that Percival Lowell thought he saw and which found their way into the fiction of Edgar Rice Burroughs and Ray Bradbury. Terraforming Mars is the subject of this article. Recent research now suggests that many of the old ideas of how it might be done are wrong. It's going to be much more difficult; the dream is

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more remote, but certainly not impossible.

First of all, we may ask, why terraform Mars at all? It is possible to envisage our future colonists living quite happily in enormous domed cities, protected from the harsh environment outside. There are three reasons that spring readily to mind.

The first is summed up succinctly in the words of James Lovelock, originator of the Gaia hypothesis. "*It would be a great help to future colonists of Mars if the planet possessed a self-sustaining ecosystem. Then the 'air conditioning,' the climate regulation and the supply of food would be an automatic background that required no thought or effort for its enjoyment.*" In other words, human beings are used to living on a world with an untamed, but nevertheless habitable, "outside." No sooner do we step out of our front doors then we are subjected to the vagaries of the climate and the biosphere. Depending on the season, we might require a hat, gloves and a thick coat, but never a hermetically sealed space suit! Most of us moan about the weather, but few of us enjoy being cooped up "inside" indefinitely. The ultimate alternative to a terraformed Mars would be a roofed-over planet, like Isaac Asimov's "Trantor."

The second reason is scientific. Planetary science is an interdisciplinary subject, involving aspects of all four basic sciences: physics, chemistry, biology and geology. Terraforming Mars could be the greatest scientific experiment ever attempted that could teach us a great deal about the Earth and habitable planets in general. For instance, one branch of science that has been attracting considerable recent interest is *Restoration Ecology*. This deals with the reassembly of ecosystems on denuded or degraded land and obviously has a good deal in common with the more grandiose speculations involved in terraforming. Restoration ecology, however, is much more than the greening of a coal tip here or a barren field there; it is in fact turning ecology from predominantly a descriptive science into an analytical one. There are those who believe that we will only be able to say we have a full understanding of an ecosystem if we are able to reassemble it from its constituent parts. Taking this argument to its logical conclusion, it follows that we may never be able to approach a proper understanding of the Earth's entire biosphere until we attempt to duplicate it, or something similar to it, on a bare and lifeless planet. That planet could well be Mars.

The third reason is really an emotional one. Terraforming is not likely to be carried out to create future *Lebensraum*—the construction of space colonies of the O'Neill type would provide much more living space at far less cost. Terraforming is instead likely to be carried out for aesthetic reasons, or as a work of art to be explored. The sheer challenge of it may be all the motivation our descendants will need.

A FIRST STEP

What is the scale of the challenge then? Mars is a planet about a ninth the mass of the Earth and just over half the

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radius. It receives an average of 43 percent of the sunlight per unit area that impinges on the Earth. It's a cold red desert of a world, a place of giant volcanoes, titanic canyons and vast plains of boulders and rust-colored sand. Table I shows the sort of physical and chemical modifications that would need to be done to prepare the planet for an Earth-like biosphere. The day length and axial tilt are already similar to Earth and need not be tampered with. There is nothing that could be done to Mars's two-fifths surface gravity—hopefully this will be tolerated by long-term colonists. It can be seen from the table that four principal modifications would be needed. The surface temperature of Mars must be increased by between 40 to 60 degrees kelvin; the surface atmospheric pressure must be raised one hundred-fold to around the terrestrial level of 1 bar; the chemical composition of the atmosphere must be made more Earth-like; and the flux of solar ultraviolet light reaching the ground must be eliminated. To a certain extent all four of these requirements are interrelated. Thickening the atmosphere, for instance, would allow less UV radiation through and would increase Mars's greenhouse effect, warming the surface. Warming the surface might release frozen gases, increasing the mass of the atmosphere and so on. . . . *For this reason, most of the previous proposals for terraforming Mars have taken, as a first step, the creation of a dense, opaque CO_2 and*

TABLE I.

Mars—Terraforming Requirements.

Parameter	Present Value	Modification required
Surface Gravity:	0.38 g	Not possible
Equatorial Rotation:	24.6 h	Unnecessary
Axial Inclination:	23.98°	Unnecessary
Albedo:	0.16	Low as possible
Mean Surface Temperature:	~ 221 K	40-60 K increase
Surface Atmospheric Pressure:	~ 7 mb	> 300 mb, ideal 1000 mb
CO_2 Partial Pressure:	~ 7mb	~ 9 mb maximum
O_2 Partial Pressure:	~ 0.006 mb	> 80 mb, ideal 200 mb
N_2 Partial Pressure:	~ 0.12 mb	>> 13 mb, ideal 800 mb
Hydrosphere:	0%	>> 0%
U.V. Band 0.2-0.3 m	~ 60 W m^{-2}	Reduce to zero

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water vapor atmosphere with sufficient greenhouse effect to warm Mars to Earth-like temperatures. At the present time, Mars would require an atmosphere of more than 2 bars surface pressure to raise the average global temperature above the freezing point of water. A lesser pressure of about 0.75 bar would allow the equatorial regions limited habitability. After this stage, planetary engineers could start to fill their rivers and seas and introduce plant life. Human beings would no longer need pressure suits, only respirators, for excursions to the countryside. In years to come, the composition of the atmosphere could be gradually rendered more breathable, with care taken to maintain the maximum greenhouse effect possible.

In the 1970s the first space probes to Mars sent back detailed pictures of its surface. Liquid water is currently not stable on the surface of Mars, and yet one of the most startling discoveries was the presence of what looked like numerous dried-up river beds, and impact craters surrounded by what appear to be mud flows, implying that at one time the climate of Mars was warmer and wetter. This, in turn, implies that the planet must once have possessed a much denser atmosphere. Theoretical models of Martian evolution suggest that the planet would have outgassed about 10 bars worth of carbon dioxide and the equivalent of a shallow ocean of water in the billion years after its formation. Less than a thousandth of this amount of CO_2 is seen in the atmosphere today and most of the water appears to have percolated underground and frozen into a layer of permafrost. Thus it soon became fairly firmly established that Mars must possess a substantial surface, or sub-surface, reservoir of CO_2 and water ice. Speculation as to how Mars might be terraformed hinged principally upon where the speculators assumed the CO_2 to be hiding.

OUTMODED TERRAFORMING MODELS

Serious planetary engineering proposals for Mars started to appear in the academic journals in the 1970s. A popular model of the Martian climate at that time was the so-called "Long Winter Model," proposed by Carl Sagan and colleagues, in which a massive amount of carbon dioxide ice (~ 1 bar) was thought to be present in the planet's north polar cap, which currently points away from the Sun at perihelion. It was suggested that the polar caps were unstable with respect to the precession of the planet's equinoxes and that when neither pole was pointing toward the Sun at perihelion, the caps would evaporate, greatly thickening the atmosphere and warming the surface. Mars would cycle between spring and ice age every 12,000 years. It soon became apparent that if this model was right, comparatively simple tampering with Mars might bring on planetary spring prematurely. Joseph Burns and Martin Harwit, of Cornell University, proposed that altering the orbit of Phobos so that a torque is applied to Mars to increase its equnoctal precession period could hasten the onset of Martian spring and then maintain it indefinitely. Carl Sagan suggested that a simpler way to this end would be to

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cover the Martian polar caps with dark colored dust or plant growth. He estimated that should the albedo (the reflectivity) of the caps be reduced by only a few percent, the extra energy absorbed from sunlight would be sufficient to start evaporating carbon dioxide ice. The increased greenhouse effect of a denser CO_2 atmosphere would accelerate further evaporation and so on, leading to a runaway situation in which the atmosphere and climate of Mars would undergo a rapid transformation. In 1976, NASA stepped in and published a detailed study of Martian terraforming to which seven scientists contributed. Their proposals also depended on the Long Winter Model, and they calculated that evaporation of the caps might only require lowering their albedo from 0.77 to 0.73 for about a century. After this very rapid step, however, they estimated the generation of a breathable partial pressure of oxygen by photosynthesis would take about 100,000 years.

None of these ideas have stood the test of time; we now know that the Long Winter Model is wrong. The Martian polar caps are composed mainly of water ice and maybe only a few millibars of CO_2 ice present. *However, the current most fashionable idea on how to create a dense Martian atmosphere is still based on the same central principle that a slight warming of the planet will release the quantity of gas required.* The reservoir in question this time is the regolith, the uppermost layer of Mars's crust. It is possible that substantial amounts of CO_2 could be present within porous rocks adsorbed on mineral grains. NASA scientist Christopher McKay has thus suggested that warming Mars by such methods as changing its albedo, using orbiting mirrors to focus extra energy onto the planet, or by introducing artificial greenhouse agents into the atmosphere might release CO_2 from this reservoir instead. He calculates that 1% of the solar energy intercepted by Mars over a period of 200 years would suffice to create a 1 bar atmosphere. Unfortunately, it looks as if this idea won't wash either and that's why I've chosen to include it in the "outmoded" section. It is unlikely that the Martian regolith could store, let alone presently contain, 1 bar worth of carbon dioxide, as theoretical models of this system predict a maximum capacity of around 0.2 bar. Addition of what gas there is into the atmosphere is governed by adsorptive equilibrium laws, rather than the vapor pressure equilibrium curve of CO_2 and a complete degassing of the regolith would be very difficult to achieve.

It seems that Mars terraforming models that propose planetary warming as a first step are running into objections. *Warming might only produce a small fraction of the desired 1 bar atmosphere.* But remember, it is probable that 10 bars of CO_2 originally outgassed on Mars, so let's see where that might be before condemning the above proposals outright.

WHERE HAS THE CARBON DIOXIDE GONE?

If several bars worth of carbon dioxide originally outgassed on Mars, and we can constrain the total amount contained as dry ice within the caps and adsorbed in the regolith to less than about 0.2 bar,

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then we are left with a considerable "missing CO_2" problem. Where is the rest of it? There are two unconstrained sinks that may have served to remove large amounts of CO_2 over the span of Martian history, namely the formation of carbonate minerals and escape to space.

In the presence of liquid water and carbon dioxide, silicate rocks will weather to produce carbonate minerals such as calcite ($CaCO_3$). One such reaction is as follows:

$$CaSiO_3 + CO_2 \xrightarrow{H_2O} CaCO_3 + SiO_2$$

There is not yet any unambiguous evidence of carbonate minerals present on Mars, but if the hypothesis of an early wet and warm epoch in Martian history is correct, then carbonate formation would have been inevitable. Calculations done by James Pollack of the NASA Ames Research Center suggest that the weathering of silicate rocks to form carbonates could have gotten rid of several bars of CO_2 after only a few tens of millions of years. Mars was doubtless more geologically active early on, and so resupply of CO_2 back into the atmosphere by volcanic recycling might have lengthened the time scale to a billion years or so. After this time, once the surface pressure had fallen below ~ 0.75 bar the planet would have frozen over permanently and carbonate formation would have proceeded at a slower rate in transient moist pockets within the soil until the atmosphere had dwindled to the tenuous state which we now observe. This scenario is to some extent in agreement with observation as it is now apparent that the Martian river beds are ancient indeed—the youngest of the runoff channels observed cutting through Mars's ancient Southern cratered terrain are dated at some 3.5 billion years old. It also implies that, averaged over the whole planet, an equivalent thickness of 200-500 m of carbonate rock has been deposited, *a vast and stable reserve of carbon dioxide that would be impossible to tap using the simple planetary warming methods mentioned above.* If carbonates are where Mars stores its missing carbon dioxide, then most terraforming proposals for Mars have so far failed at the first hurdle.

Of course, it's also possible that Mars has lost much of its volatiles to space. Until recently, it was thought that escape of atmospheric gas from Mars over the past few billion years would have been minor, accounting for only a few millibars of CO_2. However, research into impacts of asteroids and comets with planets has shown that the atmosphere of Mars, because of the planet's small mass and radius, is particularly vulnerable to an effect called "impact erosion." This occurs when the vapor plume produced by the explosion of an energetic impact is powerful enough to eject atmospheric gases into space, where they are lost for good. Impact erosion is not a significant process operating on Mars at present, but it may have played a much more crucial role in the planet's evolution over 3.5 billion years ago, when the impact flux was much higher and Mars was being bom-

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barded by remnant planetesimals left over from the formation of the Solar System.

It may be that carbonate formation and escape to space were more or less equally to blame for draining away Mars's primordial inventory of carbon dioxide. Whatever the details, one can now say with a reasonable degree of confidence that it's thumbs down for any easy first step to terraforming Mars—*warming the planet would not give you your dense atmosphere.*

IMPORTING VOLATILES

If we are prepared to assume a higher level of future technology than considered above, then planetary engineers might choose to import an atmosphere for Mars. Conveniently packaged chunks of ice and frozen gases exist aplenty in the Solar System and can occasionally be observed when they near the Sun: they are, of course, the comets. Most comets at the present time are thought to reside remote from the Sun and planets in a region called the Oort Cloud. However, it is thought that early on in the Solar System's history swarms of comets, scattered by the newborn outer planets, could have been injected into the inner system to bombard the terrestrial planets. Earth's oceans and atmosphere may be derived from geologically reprocessed comets.

It is not surprising, therefore, that comets have often been regarded as a useful terraforming resource. Jim Oberg, in his book *New Earths,* a review of terraforming, relies on comets and icy moons, or "iceteroids" as he calls them, extensively. Given a sufficiently large motor, or cluster of motors, it would be quite feasible to divert a comet from its orbit. Assuming for the moment that impact erosion is not a problem, then a comet that hits Mars would vaporize and add all its stash of volatiles into the atmosphere.

However, how reasonable is such a scenario? Is it more the product of calculation or wishful thinking? One model of the chemical composition of a comet is shown in Table II. According to the

TABLE II.

Composition of pre-cometary dust.

	Mass fraction
Silicates	0.2
Carbon	0.06
Organic Residue	0.19
H_2O	0.2
CO	0.03
CO_2	0.04
Other molecules or radicals (H_2CO, NH_3, CH_4, XCN, XS, H_2S, HCO . . .)	0.27

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model, comets are about half ices and half "solids," with carbon dioxide ice making up about 4% of the total mass. If we take the mass of a typical, Halley-sized comet as $5x10^{14}$ kg, then we get about $2x10^{13}$ kg of CO_2, a pressure equivalent at the Martian surface of 0.005 millibars. Thus to import a 1 bar CO_2 atmosphere would require the maneuver and impact of 200,000 Halley-sized comets! This is, of course, ridiculous. Such an enormous number of comets do not exist in the inner Solar Systems and diverting them from the Oort cloud would take many thousands of years. Some of the volatiles listed at the bottom of Table II might also end up as CO_2 after release into Mars's oxidizing environment, but this would not greatly reduce the scale of the problem. Bigger comets might be used instead, but would require vast energy expenditures to move. In addition, they would have to be located first! The asteroid Chiron, which orbits between Saturn and Uranus, is showing evidence that it might be a gigantic comet nucleus, by far the largest known. However, it would still require at least 50 of these monsters for our purposes and it is likely that crashing them into Mars would cause as much atmosphere to be lost by impact erosion as added from the comet itself.

Freeman Dyson, in his book *Disturbing the Universe*, has outlined what might be described as the ultimate method of importing a Martian atmopshere. He describes a scenario where a von Neumann machine (a self-reproducing robotic factory) is allowed to replicate on Enceladus, a small satellite of Saturn. When Enceladus is covered with copies of the original machine, they then proceed to take the satellite apart into numerous chunks of ice, each equipped with a solar sail to take it to Mars. Whether such a thought experiment could ever be possible in reality is an open question. I'm not too happy, however, with resorting to von Neumann machines when a problem looks insoluble. They are too much like a free lunch and, once introduced into an argument, permit no reasonable bounds on speculation. An arbitrarily advanced civilization could, in principle, achieve anything not ruled out by the laws of physics.

DEVOLATILIZATION AND NUCLEAR MINING

So, having established that the warming and importation scenarios do not seem very hopeful, and that most of Mars's ancient atmosphere is now rock, we may ask what options are left?

One clue on how to proceed was obtained from "Project Gasbuggy," part of the Plowshare program for exploring the civil uses of nuclear explosives. On December 10, 1967, a 26 kiloton device was set off at a depth of 1300 m just below a gas-bearing rock formation in New Mexico. The intention was to stimulate gas flow by fracturing the rocks and thus increasing their permeability. Sure enough, a good flow of gas was obtained after the explosion, but one surprise was that it was found to be heavily contaminated with carbon dioxide, double the amount expected. This

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was later thought to be because the bomb was detonated within a layer of shale that contained about 4% carbon dioxide in the form of dolomite, a calcium magnesium carbonate—$CaMg(CO_3)_2$.

Another clue was provided by a recent paper in *Nature*, written by John O'Keefe and Thomas Ahrens of the California Institute of Technology, in which it was suggested that an asteroid impact on a thick sequence of carbonate rocks on the Earth could release large amounts of CO_2 into the atmosphere, warming the planet due to an increased greenhouse effect. They put this idea forward as a possible additional cause of the extinction of the dinosaurs. The common process at work here is *devolatilization*. For instance, when subjected to sudden shock pressures of over 100,000 bars, calcite suffers devolatilization:

$$CaCO_3 \Rightarrow CaO + CO_2,$$

into calcium oxide and carbon dioxide. This gives us another possible way to un-petrify Mars's ancient atmosphere.

In a paper published in the recent *Journal of the British Interplanetary Society* special issue on terraforming, I looked at devolatilization in detail, to assess its potential use for terraforming Mars. When confronted with any scientific problem, it is best, initially, to simplify as many parameters as possible, so my study assumed devolatilization of pure sequences of carbonate rock. The figures from "Gasbuggy" and the O'Keefe and Ahrens paper agree quite well when appropriately scaled—about a billion kg of carbon dioxide can be released per megaton of explosive yield. This means that, at a velocity of 30 km per second, the Halley impact discussed above could release as much as 0.25 mb worth of CO_2, 50 times the amount brought in by the comet itself. In fact the chemical composition of the impactor turned out to be almost irrelevant, its main purpose being to provide the energy to release Mars's own store of volatiles. Unfortunately, however, this still leaves us needing at least 4000 comet-sized bodies to hurl down onto the planet.

Another way of achieving the intense energy release required would be to choose the Plowshare route and set off large numbers of nuclear explosives, buried underground. This idea has a number of advantages: the raw materials to build such explosives, such as deuterium, could all be obtained on Mars; the yields and depth of burial of the explosives could all be tailored to obtain the most efficient production of CO_2, whilst minimizing the loss of atmosphere to space; and it would allow the simultaneous excavation of large-scale civil works, such as Lowellian style canals. In essence, the creation of Mars's new atmosphere would be a planetary scale nuclear mining operation. Deep seated permafrost, which would otherwise take centuries to melt, could similarly be mined and forced to the surface, either as part of the ejecta from the explosion, or by reproducing the giant flash floods that once scoured parts of the Martian landscape, thought to have

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been caused by the intrusion of sills of lava into underground ice. The mining of an atmosphere could thus be coupled with the mining of an ocean.

One potential, and obvious, problem for nuclear mining could be the production of radioactive fallout. However, should it ever become possible to create a fusion explosion without a fission detonator, then long-lived radioactivities would not be a major hazard. This is because nearly all the dangerous radioactive isotopes produced by a 20th century thermonuclear bomb are fission products of the atomic bomb detonator that is needed to trigger the fusion explosion. The radioactive isotopes produced by a highly efficient, pure fusion explosion would originate mainly from atoms in the surrounding rock capturing neutrons. However, these "neutron activation products" typically have half lives of seconds to a few days and so would not be a long term hazard. It is probably not too great a leap of faith to assume that it will one day prove possible to trigger a pure fusion explosion. Nuclear explosives are not particularly difficult to make, they would not require resources from outside Mars and they could be mass produced. To paraphrase Nikita Khruschev, "they could be turned out like sausages!"

Thus, it seemed to me, however outrageous it might sound, that nuclear mining could be the most feasible and practical method of producing a dense Martian atmosphere. How many nuclear explosives would be needed to produce our 1 bar Martian atmosphere and of what yield? Well, this all depends on how Martian carbonate rocks are situated, their purity, lateral continuity and thickness—all unknowns! If we make a series of guesses at these parameters though we can at least attempt to outline the boundaries of the problem. Table III shows the range of bomb yields needed to devolatilize pure carbonate strata of varying thicknesses and the number of such devices needed to produce 1 bar worth of CO_2. It can be seen that enormous numbers of nuclear explosives are needed, on the order of ten million or more. In fact, these numbers represent a minimum; since unlike on Earth, massive, almost pure sequences of carbonate rock may be hard to find on Mars. It is ironic to think of future Martian colonists prospecting for thick layers of

TABLE III.

Nuclear mining of carbon dioxide.

Sediment thickness (m)	Most efficient device yield (Mt)	Millions of devices to produce 1 bar CO_2.
100	0.7	5700
200	5.6	700
500	88	45
1000	707	5.6
5000	88320	0.045

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limestone, rock that miners on the Earth often have to dig through to seek other minerals more prized by terrestrial civilization.

THE MINES OF MARINERIS

The nuclear mining scenario might be feasible in principle, but to be at all practical, fairly pure deposits of Martian carbonate rock must exist and must be reasonably abundant. Such strata are very common on the Earth; the white cliffs of Dover is one famous example, being composed of almost pure calcium carbonate, made from the shells of trillions of minute marine organisms that sank to the sea floor way back when dinosaurs still walked the land. However, Mars probably never hosted life and thus the hope would be to find massive deposits of inorganically produced limestone. Where would one start to look?

Well, it turns out that some scientists already suspect that the floor of the Valles Marineris may contain very thick and extensive carbonate deposits. The Valles Marineris (Mariner Valley to you and me) is a gigantic rift system that runs roughly a quarter of the circumference of Mars, just south of the equator. Most of you who have read anything about the Red Planet will have heard of it, for it is second only in fame to Mars's giant volcanoes. The Mariner Valley is often compared in books with the Grand Canyon, but it is much larger and comparable in size to the great African Rift Valley. It is so huge, that if placed across the United States it would cut the

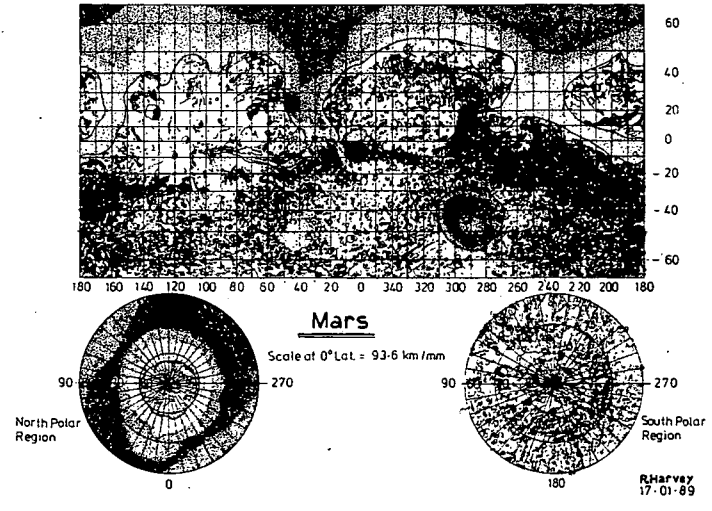

Figure 1: Layered deposits in the Valles Marineris, denoted by stippled areas.

Courtesy of the Journal of the British Interplanetary Society.

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continent in two by a chasm up to 200 km wide and 7 km deep. In certain localities on the canyon floor there are structures that Mars geologists have named *layered deposits* (see Figure 1). Now these deposits are a mystery. They are very thick, in places rising to within 500 meters of the surrounding plain, and are characterized by a fine, regular layering that can be seen to be continuous over great distances. This is, apparently, strong evidence that these rocks were layed down *underwater*. Thus, one of the contending hypotheses for the formation of the layered deposits is that they were created under enormous ice-covered lakes that would have existed when Mars's initial atmosphere was thinning out and the planet was entering the permanent ice age that we see today. The lakes would have been fed by groundwater, saturated with CO_2 and cations, leached from surrounding rocks. In the quiet conditions under the ice, the conditions would be perfect for the deposition of great thicknesses of inorganic limestone.

It has been calculated that the Mariner Valley could contain 30 millibars worth of CO_2 locked away in the layered deposits. This, in fact, may be an underestimate, since these strata may extend well below the visible canyon floor. This region may therefore be the place that our descendants choose to start mining an atmosphere for their adopted planet. You will note from the map that one of the areas of the Mariner Valley that contains layered deposits is *Eos Chasma*. Eos is the greek word for *dawn*; it may be a new dawn for Mars when the fusion fires are unleashed in Eos Chasma, heralding the end of the Red Planet's ice age and the approach of spring.

THE COMPLETION OF TERRAFORMING

So far, I've only outlined the first stage in planetary engineering that most terraforming models of Mars demand. To attain full habitability, much more needs to be done. However, speculating in detail over exactly what measures might be required, and in what order, becomes increasingly difficult the closer one requires the terraforming to produce an Earth-like end-result. This is because, not only do we lack even a moderate understanding of Mars, but we also do not yet have a complete picture of what makes the Earth Earth-like! Thus, forgive me if this section seems anticlimatic, I outline only the salient features of a possible completion of terraforming.

However it is achieved, let us assume that Stage 1 of Martian terraforming is completed. We now have a thick carbon dioxide atmosphere of roughly 1 bar surface pressure. All but the polar regions have heated up to an average temperature of above freezing. Rain clouds build up in the sky, a sight not witnessed for three billion years. The permafrost begins to melt, groundwater starts flowing again, streams, lakes and miniature seas are starting to fill.

At this point, the first attempt can be made to establish a biosphere. Because of the lack of oxygen in the Stage 1 Martian atmosphere, the partially terraformed planet would only be habitable

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for plant life. It would still, however, be much more suitable for human beings than the old Mars, as pressure suits would no longer be needed, only a respirator and air supply. Stage 2 in the terraforming process would be a much more gradual affair. The aim would be to change the chemical composition of the atmosphere so that it is breathable, whilst at the same time maintaining the greenhouse effect at a high level. It can be seen from Table I that the Stage 1 atmosphere has too much CO_2 and too little nitrogen and oxygen. The new biosphere would start to generate oxygen from CO_2 by photosynthesis—the NASA study suggests that a breathable partial pressure would build up in 100,000 years. Robert Freitas of the Xenology Research Institute, Sacramento, has estimated that von Neumann machine technology might reduce this time scale to 350 years. More realistically perhaps, we might expect that a combination of biological and industrial methods are used, producing 200 millibars of oxygen in 1,000–10,000 years. Where to get the nitrogen is a major headache, as we have even less idea of its original abundance and where (rocks or space) it has ended up. Further speculation on the nitrogen problem must await further exploration of Mars.

An Earth-like atmosphere on Mars would not have a sufficient greenhouse effect to keep the planet above freezing. The planet would have to be artificially warmed. In fact, this is where warming techniques come into their own, not at the beginning of terraforming, but at the end. The use of orbiting mirrors, or darkening the Martian surface might help increase the amount of sunlight absorbed by the planet. One fascinating idea, first suggested by Lovelock, and later developed by McKay, is to artificially increase the greenhouse effect of the Martian atmosphere by adding chlorofluorocarbons (CFCs). These are the substances used as refrigerants and spray can propellants that we are trying to phase out on the Earth, not just because of their effect on the ozone layer, but also because of their greenhouse effect, which is, molecule for molecule, some 20,000 times stronger than that of carbon dioxide. McKay calculated that one part per million of CFCs in the atmosphere of Mars would cause an enormous greenhouse effect of up to 40 K. (By contrast the total greenhouse increment of the Earth's atmopshere is 33 K.) He also suggested that since airborne CFC molecules survive, on average, several centuries before being broken down, it would only require a modest sized Martian civilization to keep the desired amount topped up in the atmosphere. On the face of it, this seems a very attractive idea, but I have one gripe—wouldn't a terraformed Mars also need an ozone layer?

Let us end by imagining what the map of Mars might look like in the year 10,000 A.D. Have a look at Figure 2. Here, artist Roy Harvey has taken a contour map of Mars and "flooded" it to the current mean radius to simulate future seas and oceans. It can be seen that the main features of a terraformed Martian geography would be an ocean in the northern hemipshere and a vast southern

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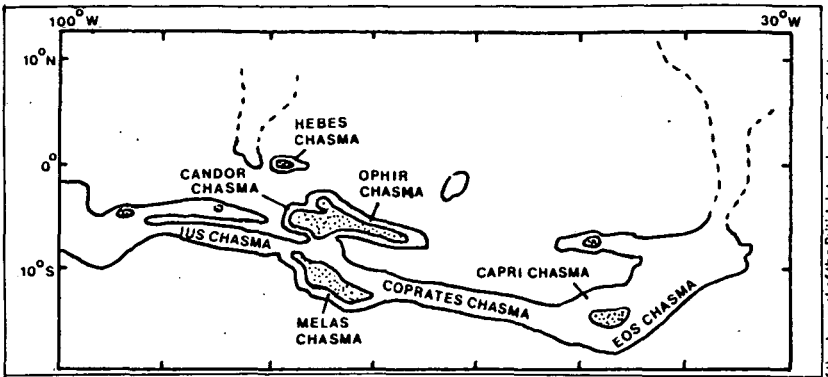

Figure 2: Hypothetical Martian oceans. This map of Mars has been "flooded" to the 6.2 mb level: relative oceanic depth is denoted by the density of stippling.

Courtesy of the Journal of the British Interplanetary Society.

continent, with tongues of land protruding in places over the equator. There would be two large, circular southern seas at about 45° S, the Hellas Sea and the Argyre Sea, created by the filling of two giant impact basins. At the north pole, there would be a small, low-lying arctic continent that would be permanently ice-bound. In contrast, at the south pole, there would be a shallow antarctic sea that might also be perpetually frozen. Such an arrangement of land and sea is very different from the Earth and would probably lead to quite alien weather patterns and climatic zones, however much the planetary engineers aim for an Earth-like end-result. However, this is just as well. We wouldn't want Mars to become a clone of Earth; sufficiently Earth-like to live on, certainly, but alien enough to remain an exciting and exotic world. ■

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SCIENCE FICTION
analog
SCIENCE FACT

CONGRATULATES THE WINNERS OF THE 1989 HUGO AWARDS

Best Novel
Hyperion
by Dan Simmons

Best Novelette
"Enter a Soldier. Later: Enter Another"
by Robert Silverberg
(IAsfm, June 1989)

Best Non-Fiction Book
The World Beyond the Hill: Science Fiction and the Quest for Transcendence
by Alexi & Cory Panshin

Best Professional Artist
Don Maitz

Best Fanzine
The Mad 3 Party

Best Fan Writer
Dave Langford

Big Heart Award
Jay Kay Klein

Best Novella
"The Mountains of Mourning"
by Lois McMaster Bujold
(Analog, May 1989)

Best Short Story
"Boobs"
by Suzy McKee Charnas
(IAsfm, June 1989)

Best Professional Editor
Gardner Dozois

Best Dramatic Presentation
Indiana Jones and the Last Crusade

Best Semiprozine
Locus

Best Fan Artist
Stu Shiffman

John W. Campbell Award for Best New Writer
Kristine Kathryn Rusch

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IF IT AIN'T BROKE. . .

Maya Kaathryn
Bohnhoff

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Randy Asplund-Faith

The difference between "damage" and "repair" depends on whom you ask. . . .

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Eugene Bulinsky is what you'd call a klutz. He's also what you'd call a flippin' genius. Unfortunately, in social situations, the one does not balance out the other. No one cares much if you're a genius when you've just dumped a gallon of clam dip on their new carpet and the clam dip clogs up the vacbot, which proceeds to explode and spray their guests with fuzzy goop. Eugene Bulinsky, this is your life.

At least it was, pre-nanny. No, Eugene didn't hire a nanny to look after him. He *made* one. Actually, he made a whole bunch of them. Euge isn't a genius for nothing.

I found out about the nannies when Eugene called me up and invited me to a party at Garry Greenwald's. My first reaction was total disbelief.

"Euge," I said, "*Eugene*. How the hell did you get invited to a party at Greenwald's condo? The last time you were there he said he'd never let you anywhere near the place again."

Eugene laughed. (It sounds like snorting to the uninitiated, but it really is laughter.) "Garry's having a problem with calculus," he said, which was explanation enough.

"And you offered to bail him out," I surmised.

"Yeah. Besides, I promised him it'd never happen again." Eugene pushed his glasses up his nose and grinned sheepishly at me from the vucom.

"Huh! Promise the poor damn cat!" I said. "He's the one with the concussion."

"I *paid* his vet bills."

"Don't whine, Eugene. I hate it when you whine." I plopped a big blob of clay on the table in front of me. "And how the hell could you promise Greenwald something like that? You leave a wake of total destruction wherever you go. You're like Hurricane Eugene."

"Not anymore," he told me.

Something about the way he said that made me take my attention off the award-winning sculpture I was working on, and look at him. He was glowing. I knew what that meant. I glowed when I completed a sculpture; Eugene glowed when something in a test tube cried "Papa!"

"Oh, God," I said. "OK, Frankenstein, what've you done this time?"

"Nannies," he said.

"Huh! I always said you needed a keeper."

He snorted and yukked a few times, then pushed his glasses back up and said, "Not a nanny. *Nannies*— nanomachines."

"Nano-what?"

Eugene looked exasperated. "Honestly, Nina, sometimes you're such a dwit. *Nanomachines*. Little tiny machines that do little tiny jobs. Except that *these* nannies do big jobs. They're . . . meganannies."

"Meganannies," I repeated.

"OK, so that probably sounds like a contradiction in terms, but well, they're bigger than most nanomachines; too small to be called micromachines." He shrugged. "So—mega nannies."

"Right. Well, that's very interesting, Eugene, but I don't have time to concern myself with all this scientific mumbo-jumbo, right now. I'm preparing to create some truly great art."

Eugene scratched his head, which he

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always does when the subject of art comes up. He didn't understand art any better than I understood nano-whatever-it-was. I asked him to explain the nanny business to me again, but he went multo-mysterioso and told me I'd have to wait till the bash at Greenwald's to witness his new invention—and his new persona.

Great, I thought. Dr. Nanny and Mr. Hyde.

Saturday night we arrived at Garry Greenwald's Marblehead condo when the party was in full swing. Everybody watched our entrance and it wasn't because we made such a glam duo—although Euge looked better than usual, I had to admit. His hair wasn't in his face and he wasn't wearing that damned white jacket that looked like a cast-off from Dr. Who. Together, well, together we were quite a sight. He is *so* conservative and I'm *so* Punkemian.

Garry looked like he wanted to run and hide when he saw us. I saw him glance toward the aquarium like he might go throw his arms around it for a final farewell. Instead, he smiled (talk about in-sin-*cere*) and came over to say "Hi."

Actually, what he said was, "Bulinsky, if you screw up my condo again, so help me—"

"A Bulinsky never makes a promise he can't keep," said Eugene solemnly.

"A Bulinsky never makes a party he doesn't wreck, you mean."

"Go soak it, Greenwald," I snarled. "He promised, OK?"

Eugene was already wandering off toward the buffet. Garry paled.

"God, Greenwald, you're such a yup. Didn't your folks ever teach you that friends are more important than *things?*"

He glared at me. "God, Zubin, you're such a Punk. Didn't your folks ever teach you that money doesn't grow on ATM's?"

"Oh, look who's talking!" I shot back. "Your family is so loaded, you could *buy* Boston UAT. *I* got here on an art scholarship and Euge lives from grant to grant."

"Euge!" He glared at the buffet again. "I don't know why you hang around with that nerd, Nina. People think you're weird."

"People think I'm weird anyway," I said. "Or hadn't you noticed?" I swung my head quickly toward the group next to us and caught Susie "Sugarlips" Santini staring at me.

She smiled and pointed a gold fingernail at my head. "Nice stripe," she said. "That's real cute the way you dyed your hair to match your . . . outfit."

I gave Greenwald a "so there" look and went to find Eugene. He was still at the buffet happily stuffing his face.

"Tr' un'a dzz," he said as I arrived. He was holding out a puffy little ball of something vaguely fishy smelling.

I shot a glance back at Susie and nibbled it out of his fingers. He grinned, she looked like she wanted to throw up.

"Lemme get you a plate," he said.

Before I could say, "Don't bother," he'd reached across the table, between the coffee samovar and the punch bowl, and grabbed a bio-foam plate from the stack.

I saw it coming before it happened: the plate hitting the punch bowl's long-handled glass dipper; the dipper flipping up, end over end in a graceful arc,

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spraying bright pink punch all over the white table cloth and coming to rest with a cartoon "squish!" in an untouched mold of Crab Angelica which disintegrated into goopy blobs. The effect was almost artistic.

I heard a loud groan go up around the buffet and glanced at Eugene. Usually, when these things happen, he blushes, cowers and apologizes like crazy. But this time, he was just standing there with his hands in his pockets, grinning.

"Eugene?" I said.

He just shook his head and twinkled at me.

"Dammit, Bulinsky!" bellowed Greenwald's voice in my ear. "You promised!"

Eugene yukked a couple of times. "No problem," he said. "Watch. Watch!" He pulled the dipper out of the mold and laid it on the devastated table cloth.

It was like a bizarre ballet set to the beat of the Shrewd News. While we watched, the crab spread was pulling itself together—literally—reshaping, remolding . . . it was kind of gross, actually. Even the little crab-shaped indentation on top reappeared. It looked like it'd just crawled out of the caterer's van.

The dipper, meanwhile, was getting cleaner by the second as if some tiny, invisible dogs were scarfing up the crab spread with invisible pink tongues. And the table cloth—heck, I've seen stains disappear like that in commercials, but never in real life.

It took about five minutes, all told, before every trace of Eugene's extraordinary grace was obliterated. He grinned harder and slipped the sparkling punch dipper back into the bowl.

It was so quiet on that side of the room you could have heard a pin drop—except for the Shrewd News blaring from the quadro and Eugene yukking and snorting like there was no tomorrow.

It took the crowd about ten minutes to recover. It took me longer. I was watching them examine the table inch by inch when I felt a tug on my arm. Eugene was giving me a look that was one-quarter Captain Kirk and three-quarters space cadet.

"This party's dull. Let's go have dinner."

I let him steer me out to the car. I heard two "Nice stripes," and one "God, where does she get those clothes?" on the way through. I didn't even stop to snarl. They must've thought I was sick.

He took me to the top of the Prude to this incredibly ritzy, incredibly expensive place with candlelight and real flowers and detoxed wine.

"OK," I said when we were sharing a stunning view of the city. "Two things: One, how'd you do that trick at the party; and two, how are we paying for dinner? My plastic is limp."

"Second thing first," said Eugene. "*I'm* paying—cash. And firstly—" He took off his glasses, set them on the table and rubbed the little red spots they left on his nose. "—that wasn't a trick. It was the nannies."

The nannies again. "OK," I said. "Let's hear it."

He leaned toward me across the table. "You know my field of research is nanotechnology."

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"Y-ye-ah," I said dubiously.

He sighed. "Nina, you don't listen to me. Nanotechnology is the design and construction of tiny machines that perform programmed tasks."

Slow dawn over Zubin. "Like cleaning up after Hurricane Eugene?"

He nodded eagerly. "Exactly. Except that true nanomachines work on a molecular level and they're programmed to fix things on that level: chromosomal damage, tissue damage, that sort of thing. They can even act as antibodies. My meganannies, on the other hand, are especially designed for bigger jobs. They're programmed to fix tiny broken things, clean up messes, put things straight."

"Wow!" I said. "That's pretty impressive. So now you're safe to have around. How do they work?"

He gave me a dubious look. "I'm not sure you'd understand, Nina."

"Give me *some* credit, Bulinsky."

"Well, OK, you might understand, I suppose. Um, let's see. . . . OK, here. You're an artist, right?"

I nodded solemnly.

"And you know, say, what the, um, Mona Lisa is supposed to look like, right? So if someone painted a moustache, say, on the Mona Lisa, you'd notice it right away. And if you had the talent—and I'm sure you do—you could fix it, am I right?"

I continued to nod.

"Well, the nannies don't have talent, but they have programming that recognizes and memorizes default patterns—like the real Mona Lisa. Some of the patterns I preprogrammed, others are assimilated by the nannies as they, well, shop around, I guess you'd say—make comparisons and check it against their existing data. If for some reason a pattern is distorted, they return it to the control pattern—the default. That is, they fix it."

I applauded. "Very good, Eugene."

"Yeah," he agreed. "And just think of the applications. Homes, businesses, labs, hospitals: places that just have to be clean. Places humans and larger machines can't clean."

"Whoa," I said. "To boldly go where no bot has gone before."

"Very funny. But seriously, Nina, these little guys can do a lot more than what you saw them do tonight."

"I didn't see *them* do nada. I saw a crawling crab spread. What do these things look like?"

In answer, he pulled out his wallet and handed me a holopic. I goggled at him.

"You carry pictures of them in your wallet?"

"How else am I supposed to show you what they look like? I can't exactly carry a microscope around in my pocket."

"OK," I acquiesced and looked at the holo. "Holy shit!" I exclaimed. Other patrons glared at me, offended. I ignored them. "They're . . . They look like-like *bugs*."

"Well, I guess they are bugs, sort of. Programmable ones."

"Geez, they're ugly. Ugly, colorless bugs."

"Beauty," Eugene informed me, "is in the eye of the beholder." He took the holo back and tucked it into his wallet. "I happen to really like that orange streak in your hair."

"Thanks," I said, "but it's peach.

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How do those little tiny things move stuff around the way they did at Garry's?"

Eugene beamed (and I mean *beamed*) at me. "That's one of the things that makes the Bulinsky Megananny special. When a job is too big for the individual nannies, they combine to form a group machine—a micro-machine, or, well, sort of a nanny gestalt. They can also replicate themselves. The size of the replicant will depend on two things: First, the amount of convertible matter and/or energy around to fuel the replication process and, second, the size of the job at hand. Bigger job—bigger nannies. Of course, there is a limit to what they can do. Most macro-objects are beyond their abilities . . . unless I can crack the energy barrier."

"Macro-objects," I repeated. "You mean big stuff like the punch dipper."

"Very good, Nina." He seemed surprised.

"Don't patronize me. . . . So how big is too big?"

He replied by very deliberately pressing the face of his wristcomp. Then, with a flourish, he set the crystal sugar bowl in the center of the table and made this "nothing-up-my-sleeves" gesture. "Observe," he said and sprinkled pink fructose on to the table cloth.

I glanced quickly around to make sure there were no waiters watching. The last thing I wanted was to get tossed out of this place before I'd eaten. By the time my eyes returned to the fructose, it was already on its way back to the bowl.

"That's it?" I asked. "Sugar crystals?"

"Well, no. Actually, they can handle grains of sand, dust balls, even individual sheets of paper. But those jobs take a pretty big gang and a lot of convertible matter."

"Convertible matter?" I asked dubiously.

Euge waved a dinner roll at me. "Or energy," he said, and took a big bite out of it. "Food."

My stomach gurgled. "Speaking of food," I said. "Can we order?"

He sighed and nodded, popping the rest of the roll into his mouth.

Dinner was fantastic. Eugene let me babble on about the grant and residency I was up for, and my gallery opening next weekend, and how I was going to take the art world by storm with my new stuff.

He didn't even seem to mind me making him come up to my studio to look at it. And he tried really hard to appreciate it too. I could tell. When I whisked the sheet off the main piece, he stared at it intently, then he wriggled his eyebrows, wrinkled his nose, took off his glasses, cleaned them on his jacket, put them back on and puckered his lips. Then he made a slow circuit of the piece.

"It's, ah . . . it's, ah . . ." he said.

"It's a man," I said. "Man in Anguish."

"Yeah. Yeah, I can see that. But, it's ah . . ." He frowned. Waved his arms. "Wrong, somehow."

"Wrong?" I snarled. "WRONG? A man who wears white socks with black silk pants is telling me my sculpture is *wrong?*"

"I didn't mean it that way. I meant it-it's out of balance . . . or . . . something . . ." He looked at me sheep-

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ishly. "Don't listen to me. I don't know anything about art."

"That's an understatement."

"I'm sure it will really impress the selection committee," he said placatingly and pushed his glasses up his nose. "Um, how about some coffee?"

I relented. Eugene had this way of looking like Clark Kent. I could never stay mad at him for more than a second or two.

When I came out of the kitchenette with the coffee, he was sitting on the sofa in my small raised living room looking down into the studio. I scooted some magazines off the coffee table and put down the tray, then flipped a clay-caked sweatshirt off the sofa and sat down. I became aware of Eugene's intense scrutiny. When I glanced at him, he looked away again, nervously nudging a baseball-sized dust bunny with his foot.

"Uh, Nina, I don't mean to criticize your housekeeping, but—"

I was suddenly intensely embarrassed. "This place is a mess, isn't it? I'm sorry. I guess I need a vacbot, but the damn things are so *expensive*. Besides, it'd choke on the stuff it'd have to clean up down there." I nodded toward the studio.

Eugene was twinkling at me again. "You don't need a vacbot. You need a nanny."

I started to get all indignant, then realized what he was talking about. "You mean Bulinsky Meganannies? Well, sure! That'd be great! I'd never have to think about housework again." (Not that I gave it much thought then.)

Eugene touched his wristcomp. "There. They're all yours," he said. "At least this bunch."

"That's it? You just turned them loose?"

He nodded. "By the time we're done with our coffee, this pleace will be as clean as my lab. You won't even have to wash that sweatshirt. . . . You *will* have to put it away, though."

I did, too, but I didn't mind picking up the sty if the nannies were going to be doing all the slopping. And, bless their little default patterns, those nannies just seemed to know that tuna salad did not belong on the studio floor nor cracker crumbs in the bathroom.

"So, what do I feed them?" I asked Eugene as he was on his way out the door.

"Nothing."

"Then, what—batteries?"

Eugene yukked. "You can't put batteries in something that small! Even a millimeter flat-chip solenoid would be thousands of times too big for the largest nanny. Brighten up."

"Brighten up, yourself," I told him. "I just figured they had to have some kind of fuel."

"They do. They subsist on a combination of energy sources. Solar and electromagnetic energy, which they can store—"

"A-*ha!*" I said, poking him. "Batteries!"

"OK-OK—batteries. Plus, they intake the surplus organics—the garbage they clean up—and they consume any harmful bacteria they may find. It's a bug eat bug world." He yukked again.

I pushed him out the door.

I could tell right away that life with nannies was going to be great. It im-

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proved my standard of living a thousandfold in the first few hours. Didn't improve my stable manners any. In fact, I think it even made me a bigger slob, knowing that thousands of tiny butlers were following me around straightening up after me. Talk about having your cake and eating it! I didn't even have to worry about where the crumbs fell.

I told myself that with the bulk of the burden of mundane housekeeping lifted from my shoulders, I could easily turn out the several additional major pieces I needed for the gallery opening. (My big break!) Plus, I needed some "works in progress" to show the grant selection Committee on Wednesday.

I spent Sunday hopping art galleries for inspiration, then Monday morning I got down into my creative chakras and started a new piece. I unveiled "Fred" (Man in Anguish, to you) and let him look over my shoulder while I gave birth to his sibling.

It was a smaller piece than Fred, or rather "she" was. She was destined to be a ballerina (inspired by the Degas's I'd seen the day before), but with a classic Zubin twist. She was going to have five arms. I'd also seen a truly cream statue of Siva yesterday (Lord of the Cosmic Dance and all that) and thought his six arms were just incredibly expressive of the rhythm and movement of the cosmos. But, of course, six arms were just so symmetrical, so *ordinary*. So *my* Cosmic Dancer would have five arms.

I put on some passionately energetic Russian music and worked in a frenzy, getting a big kick out of the way my team of nannies scarpered up every nibble of rubble that hit the floor. I mean, vacbots, look out! The place looked like a hospital operating room.

I had classes beginning at 1:00 P.M., so at 12:30 I bid a reluctant farewell to Fred, Pavlova, and the dust patrol, and marched off to satisfy state educational requirements. It was a long afternoon. All I could think about was my five-armed Pavlova and the GSC and the gallery opening and the dawn of Nina Zubin's stellar career.

It was 5:00 when I got home, and getting dark. I had an armful of backpack and groceries and had to turn the light on with my shoulder. (These low-rent digs don't have housecomps and sense-switches to turn them on for you.)

"I'm home!" I announced to my menagerie and turned to greet them. I stopped dead in my tracks. My pack and groceries thumped as they hit the floor. "Oh, my God," I said and moved zombielike toward the studio.

I couldn't believe it. Instead of a Man in Anguish and a Cosmic Dancer, I had Two Men in Anguish and a Sculptor in Confusion. I came slowly down the steps, staring. Fred II was an exact duplicate of Fred I in every way but size. He was even casting his anguished gaze in the same direction.

Somewhere in the back of my mind, a bit of conversation played back. Something about nannies and artists and moustachioed Mona Lisas. I heard Eugene's voice saying, "Nannies don't have talent—" Fast forward. There it was—that bit about "recognizing and memorizing default patterns."

I stewed. Maybe I should've been flattered—the nannies had evidently recognized Big Fred as a "default pattern" and given me Little Fred. Of

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course, that also meant that Pavlova had looked somehow distorted to them. All in all, they cost me a morning's inspired work.

I swore violently. I wondered if nannies could hear. Eugene hadn't said so. I continued to swear anyway.

There was nothing to do but start over again. I got out some fresh clay, covered the Freds and turned on the Russian music. It was tough, but I managed to recapture my inspiration. After many intense hours of pounding, molding, weeping, and cursing, I had a Cosmic Dancer that surpassed my first attempt.

I quickly threw a sheet over her to keep the nannies from getting ideas. Then I ate a late dinner and called Eugene to give him a hard time about his nannies' antics. He wasn't home, so I left a saucy, Zubinesque message about naughty nannies on his vucorder.

I overslept the next morning, barely made it to my mid-morning classes and raced home to start work on my next piece. I already knew what it was going to be—a mime. A mime with a dagger. A mime into crime. I would call it "Deadly Silence" and it would knock the committee's socks off.

When I finished up at about 3:00 AM, I just flopped onto the sofa and stared at him for a moment. He was beautiful: posed in that dainty, mime arabesque; his head tilted to one side; his little peaked hat askew; the dagger drawn up to his left cheek while crazed eyes stared over it at the viewer. Gave me chills.

I got out my old Panasonic Discam and circled him slowly, shooting him from every angle. I noticed that the nannies were at work on the little pile of scrapings by his pedestal.

"Good nannies," I said. "Have this place finessed by ten hundred hours, got it?" I covered Petrucchio and flopped back onto the sofa.

I overslept again. Seriously, this time. I woke up at 9:35. The grant selection committee was due at 10:00. I literally threw myself into the shower, dressed like a madwoman (there are those who say I always dress like a madwoman) and gobbled some breakfast. Thank Eugene, I didn't have to clean up the crumbs. With two minutes left, I brewed coffee and raked my hair.

The door chime sounded promptly at 10:00 as the committee stepped onto my front porch. I flatter myself that I was all poise and dignity when I let them in. There were three of them and they were escorted by my art professor and mentor, Professor Frewer. I smiled at him and he smiled back, then introduced me to his colleagues—the Drs. Midori Hirasuna and Ford Goodwin, and artist Jeff Ripley.

I was in love. Midori Hirasuna was everything I wanted to be: Sleek, shining, stylish, stunning—all those great "S" words. I knew she was an artist of great style, too, and desperately wanted her to like my stuff.

Coffee and interview came first. I answered questions, smiled a lot and tried to come across sensitive, quirky, and artistic. Then came the unveiling.

I went to Big Fred first, slipped the sheet from his gaunt frame and announced, "I call this one Man in Anguish."

"Ah, ha," said Professor Frewer. He puckered his lips and looked professorial.

I glanced at Professor Hirasuna. She

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was scribbling notes, a very tiny frown between her perfect brows. Ripley nodded. Goodwin had a poker face.

"Do you have anything else, Nina?" asked Professor Frewer.

"Yessir," I said and turned to Pavlova's platform. "This is Cosmic Dancer." I pulled her cover, watching their faces. There was no expression in any of them.

"When did you change your style, Nina?" asked Frewer.

"Well, you know I've been trying very hard to develop a style of my own," I answered eagerly. "This is what I came up with."

He frowned. "I'm just a little puzzled. You told me you didn't have any interest in realism."

I goggled at him. A woman with five arms—realism? I turned to Pavlova and goggled again. She didn't have five arms, she had two. Two graceful, symmetrical, very normal arms that went with her graceful, symmetrical, very normal body. And she was strikingly familiar.

Dazed, I crossed to Petrucchio's pallet and gingerly tugged off his sheet. So much for high art. My beautiful, twisted, deadly mime was now a rounded, whimsical clown. Even the dagger was gone. In its place was an old-fashioned bicycle horn.

"These pieces are really quite a departure from the first one," commented Hirasuna. "Is this your entire collection?"

"Uh," I said. "Yes . . . right now anyway . . . Uh, these were sort of an experiment. They're not representative. Like I said, I'm searching for my own style."

Hirasuna nodded.

"Your technique is flawless," said Ripley encouragingly.

"Thanks," I said and wondered if I should try to explain about nannies and default patterns.

The committee held a brief conference on my rear balcony, then left, leaving me alone with Professor Frewer. He looked almost as confused as I felt.

"Nina, this wasn't a real good time for a dramatic change in artistic direction. I showed the committee your sketches. They expected . . . something quite different."

"So did I," I murmured.

He glanced back toward the studio. "The realistic pieces are nice," he said (in that way that makes "nice" sound like "God-awful"), "but they're not exceptional. And they have to be to warrant a grant and a residency."

"What about Fred?" I asked desperately.

"Fred?"

"Man in Anguish?"

He looked at it, pulling his lip and squinting. "Well, it's interesting but . . . I don't know, there's something . . . wrong about it. It seems . . . out of balance, somehow."

I don't believe this, I thought. "So, no grant? No residency?"

He looked sympathetic. "I know you're capable of better work, Nina. Look, do you think you're going to have some more pieces ready for your opening?"

"I-I hope so," I said dubiously.

He put a hand on my shoulder. "Don't look so defeated. The committee won't complete its evaluations for another two weeks. If you can have

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some new work at the opening, I'll make sure they see it."

When he was gone, I sat on the sofa with my head spinning. OK, so I had a second chance. The first thing I had to do was get rid of those damned nano-vandals. I called Eugene. He still wasn't home. I left an obscene message on the 'corder and snapped off the vucom.

Damn! How was I supposed to get any work done with thousands of little art critics rearranging everything to their default patterns? And what patterns! A dolly-dancer and a circus clown. Where the heck did they get—

My eyes focused on the cover of an art magazine on the coffee table. One of Degas's pink and blue ballerinas gazed back at me. I looked at my statue. The pose was identical.

OK. Default pattern number one. But I knew I didn't have any art magazines with *clowns* on them.

"O-oh!" I groaned and smacked my forehead with the heel of my hand. The only clown in this apartment, besides me, was the stuffed one on my bed.

I hid the magazines, the clown, every piece of bric-a-brac I owned. Alas, the nannies simply looked elsewhere for "inspiration." Every surreal form I made, they painstakingly herded into the epitome of bland. At one point, I had a two hundred pound ottoman and a clay replica of a macrame wallhanging I forgot to take down and hide.

But in the midst of defeat, a light went on. I was galvanized. Cackling like a banshee, I tore around the kitchenette strewing garbagy tidbits all over the floor—coffee grounds, egg shells, old dead alfalfa sprouts—you name it, I strewed it. I created a mess of such epic proportions, an army of vacbots would have mutinied at the sight of it. Then, while the nannies were busily attacking that, I attacked Pavlova and Petrucchio and reduced them to their component clay lumps. In their place, I erected a huge form that pushed the very limits of the surreal. (Just in case, I thought.)

When I finished, I was ravenous and thirsty and had a hell of a headache. I got myself a soda pop and went back to assess my work. I stepped over a self-stacking pile of art clippings and a herd of dust bunnies that was making its way back to the recyc and flopped down on the steps between the living room and the studio.

What I had here was definitely different. It was part man, part mountain and part Gaudi cathedral. It looked almost, but not quite, like fire that had been magicked into stone. I liked it. In fact, I thought it was probably the best work I'd ever done—except maybe for poor Petrucchio.

While I was sitting there, patting myself on the back, I saw it start. A smooth patch became slightly pocked, a small hole enlarged itself. The nannies were on the move.

I jumped to my feet. "Dammit, *no!*" I shrieked. "Stop it! Stop, you stupid nannies! That's not an accident—it's *ART!*"

They ignored me.

Snarling, I launched myself across the room to my workbench, grabbed a couple of lumps of fresh clay and hurled them in the general direction of the nannies. A lot of other stuff followed, a big bowl full of pebbles, a trayful of sea-

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shells, some handfuls of colored glass chips, a lot more clay.

"It's not broken, for godsake!" I cried. "Don't fix it!"

Sobbing frantically, I ripped at the pile of magazine clippings I'd hidden on the top shelf of my workbench, sending a litter of paper to join all the other crap on the floor. Maybe while they were busy with that, I could move my beautiful whatever-it-was out of nannies' way.

But they weren't to be distracted. Tiny changes continued to edit the surface of my creation even as the new junk began to stir. They'd just deployed their ranks—probably replicated or whatever it was they did.

Oh, for a vacbot! I'd suck them all up and-and—

"Damn you, Eugene Bulinsky!" I cried passionately and sailed across the apartment to the vucom. He was *still* out. I left a frantic, pleading, vicious message in which murder and suicide figured prominently. Then I sat down to have a good cry.

Many teardrops later, I looked up, bleary-eyed, to see what the nannies had done to my career. I stared. Then I pulled myself to my feet and moved dazedly back into the studio.

My Zubin masterpiece had kept the shape I gave it, but the nannies had added some stylistic nuances. In fact, the pocked and scarified surface of the thing looked much more interesting. It had pebbles and seashells and bits of glass embedded in it and it sparkled like the crown jewels under the studio lights. Even as I watched, a tiny, dried out husk of a starfish crawled into place among the sand encrusting its base.

I stared at it until the activity seemed to be at an end, then circumambulated it slowly. It was magnificent, imposing, dreamlike. Except for the towel draped across the pebbly "beach."

"For pity's sake, you guys," I complained. "Couldn't you at least've shoved it out of the way?" I reached for the towel and yelped as my fingers met clay instead of cloth. "Holy mackerel, it's perfect!" Perfect, except for the finger prints I'd just left in the fleecy-looking surface. The nannies quickly fixed it.

I shoved a neat stack of magazine clippings aside and perched on the workbench. This was incredible—the achingly weird and the boringly mundane combined in the same stupendous work of art. And it was all mine . . . well, at least, most of it was.

"Oh, you beautiful nannies," I breathed. "Where did you get this one?" It had to be something fairly close at hand.

I glanced down at the stack of clippings. On the bottom was the front page of a travel rag surmounted by a neat pile of smaller pictures that hadn't made it into my "morgue" yet. The caption on the front page read: Ski and Scuba Among Australia's Coral Castles. I moved the clippings so I could see it better. That was a coral castle, all right—right down to its embedded inhabitants. An inset showed a sun-washed beach. I looked at the clippings in my right hand—Antonio Gaudi's Barcelona Cathedral was right on top.

My eyes moved back to my—OK, *our* sculpture. It was an almost perfect compromise between the similar yet distinct patterns in the photos. I frowned.

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But where the heck did the towel come from?

I turned over the Gaudi and laughed aloud. A beautiful, fleecy bath towel dominated the half-page. It was an ad for a Bloomie's white sale.

Two days and a lot of clay, junk, and magazine clippings later, I and my team of apprentices had a gallery annex-full of Zubin magic to show the world. It was a true team effort: I laid the foundation of surreality, offered the meganannies some raw materials and several "inspirational patterns," and they did their best to make sense out of it all.

I had to admit, I'd never worked so hard in my life or felt so creative. As I pushed myself to drag more and more original forms out of the ether, I realized that *I* had default patterns, too—and up until now, they'd been damn boring. But no more. And as an added bonus, other people seemed to find them interesting, too. By the time the selection committee came into the gallery on Saturday morning, I'd already sold two pieces.

"Oh, *Nina*!" whispered Professor Frewer in my ear. "This is more *like* it! Look, even Hirasuna is impressed."

She certainly seemed to be. She was nodding and scribbling like crazy. When she reached out and tried to pick up the towel at the base of the Cosmic Castle, she even *smiled*. (Grant, ho!)

"Quite remarkable," she told me as they were leaving. "The juxtaposition of real and surreal is . . . magical. What inspired you to take such a dramatic artistic direction?"

I shrugged. "Well, like I said before, I was just seeking my own style. You know, my own natural . . . default patterns." I smiled brightly.

"Well, you seem to have found them," said Mr. Ripley. He shook my hand.

Old, gruff Professor Goodwin shook it, too, hard enough to make his jowls shake. "Ahem. Good work, young lady," he said. And Professor Frewer hugged me, looking like a proud papa seeing his precocious precious off to college.

I was rocking back on my heels, mentally counting my earnings when Eugene came in. He looked like he'd run all the way from Swampscott.

"Nina! Gosh, Nina, I just got your messages. I'm really sorry about all this." He ran a hand through his rambunctious hair.

It was mean of me, but I decided to put my old buddy Euge through the wringer for all the agony I'd been through on the road to victory. I scowled at him. "And just where the hell were you, Mr. Bulinsky, while I was being held hostage by your nano-terrorists?"

He blushed and actually scuffed the floor with his foot. I'd never seen anyone do that before. "I was out hawking Bulinsky Meganannies, trying to generate some interest in my programming."

"Hmmm," I said sourly. "And did you?"

He scuffed again. "Yeah, actually, I did. Now, I kind of wish I hadn't. Gosh, Nina, I'm sorry they screwed up your artwork."

"Eugene Bulinsky, I want you to see exactly what your little beasties did to my artwork." I led him into the annex

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(the Zubin Wing, I liked to call it) and stood him in front of the Castle.

"Oh, gosh," he said. He pushed his glasses up, then took them off and cleaned them. "Oh, Nina, I'm sorry. Is this terrible?"

"Terrible?" I laughed out loud, then planted a wet one on his forehead. "Euge, you dwit, it's incredible! I've sold three pieces since we opened this morning. And in about two weeks, I'll be a granted resident of Boston University of Arts and Technologies."

He looked hopeful. "You mean, I'm not going to have to take my nannies back and reprogram them?"

"Reprogram them? Euge! *Eugene!*" I tweaked both his cheeks. "Let me remind you of an old bit of wisdom: If the default pattern is in working order, reprogramming would be counterproductive."

I linked my arm through his and rocked back on my heels, surveying my magic kingdom. "In other words, Eugene: If it ain't broke, don't fix it." ■

●In the judgment of many researchers, molecular systems engineering—leading as it will to nanotechnology and molecular manufacturing—is among the top two or three fields in its importance to 21st century technology. Although the US has great strength in relevant areas of basic science, molecular systems *engineering* is not primarily a *scientific* problem: no amount of scientific study can yield a working aircraft, and no amount of scientific study can yield a working assembler. Progress toward nanotechnology will depend on interdisciplinary technology-oriented teams guided by a vision of what molecular systems engineering can accomplish. Today, Japan has the vision and the teams. The United States doesn't.

K. Eric Drexler
The *Foresight Update* newsletter No. 9 p. 12

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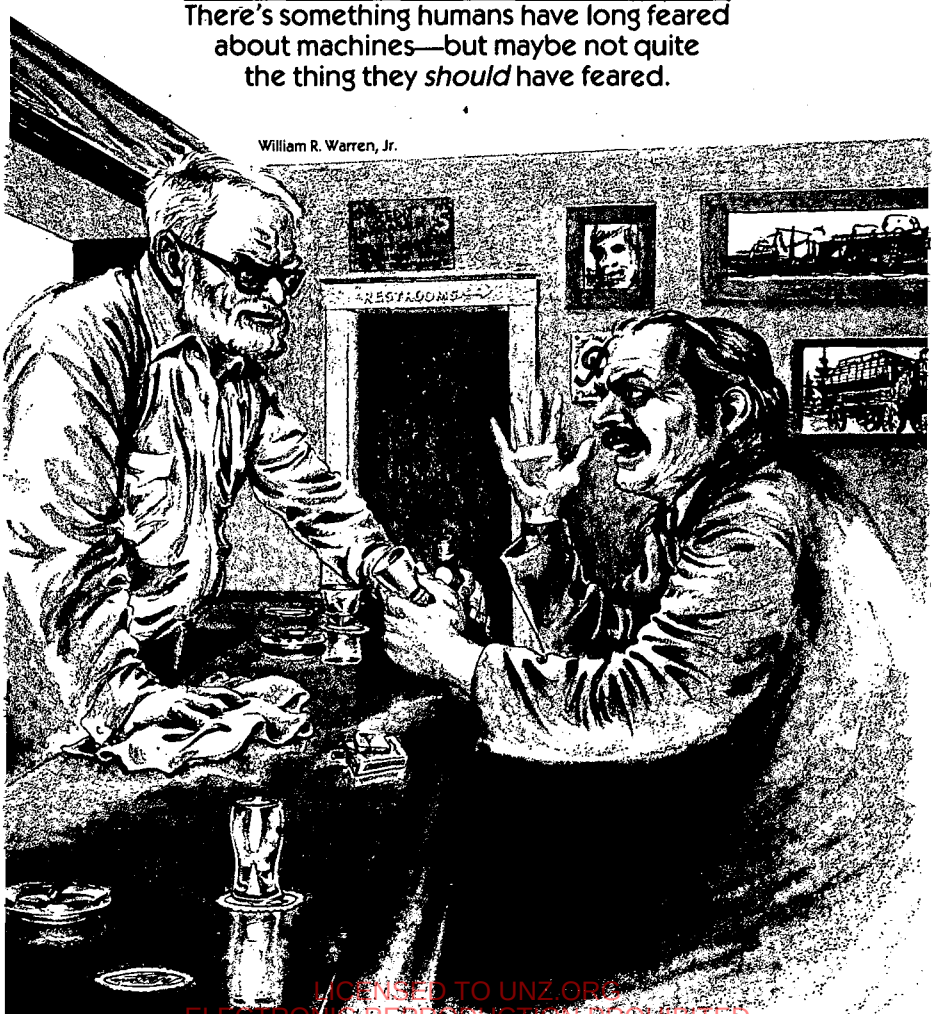
SPARK OF GENIUS

Michael F. Flynn

There's something humans have long feared about machines—but maybe not quite the thing they *should* have feared.



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He was a mean drunk; the solitary sort who scowled for long minutes into the amber mirror of his liquor before tossing it off in a single spasm of the arm and throat. The kind whose empty glass struck the bar like a hammer, so that the other patrons would look and as quickly look away. They had left a careful number of vacant stools between themselves and him. A type like that—you never could tell what would set him off.

The barkeeper approached, wiping his hands on his apron. Whatever else it might presage, an empty glass striking wood was the sound of money in the till.

"Another?"

The drinker looked up. "Double," he said.

The barkeeper did not reply, but poured from the bottle. He used the bar Scotch. Subtleties of taste would be wasted on this one. The drunk grasped his wrist as he turned away.

"Leave the bottle."

"I'm afraid that is against house rules, sir." It was his house and his rules; and sometimes he left the bottle and sometimes not. His voice was polite, but his left hand felt under the bar for a length of steel pipe that he kept there. Not that he thought he would need it, but you never knew, and the insurance gave him a sort of peace of mind. It was a hell of a world.

The drunk released him. "The hell with it. The hell with you." The barkeeper relaxed and turned to go. "Hey!"

"Yes, sir?" *Sir* because even a surly customer is a customer.

"You've got to stay and listen to my troubles. Isn't that part of the job description? Priests, shrinks, cops, and bartenders. They all gotta listen."

The barkeeper nodded to his relief man to take over. He folded his beefy arms across his chest. "All right. I'm listening. So what's your trouble?"

The drunk seized the shot glass and tossed off its contents. "My problem," he said when he banged it down, "is I'm too damned successful."

The bartender grunted. "Sure, we all should have those problems."

The man clenched both hands into fists on the bar top. "You don't understand. I've just written a best-seller."

The bartender thought about it. Then he poured himself a glass of bottled water—water, because only a fool drank his own profits—and took a sip. "So, tell me about it."

Ward's desk was an old wooden rolltop. Its pigeonholes were stuffed thick with letters and memos. A stack of manuscripts, boxed and tied with string, filled one corner. The walls were lined with copies of the books Ward had bought—at least, the successful ones. In another corner of the office, a copy editor peered through thick-lensed glasses while she blue-penciled a set of galleys. All in all, it was what an editor's office should look like. Armitage waited uncertainly just inside the door.

"About my manuscript . . ." he said.

"Sit down, Ken, sit down." Ward waved to a dark wood captain's chair with a pillow seat cushion. "The reason I asked you to come into the city—"

"It's about the book I sent you, isn't it?"

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Ward blinked. "Why, of course it is. I've read it and—"

"I understand. I had my doubts about it when I sent it in."

Springs creaked as the editor leaned back in his swivel chair. "What on earth are you talking about?"

"It's pretty awful, isn't it?"

"Awful? Awful!" Ward rolled his eyes up to heaven. "Now you see why you're the writer and I'm the editor. Ken, it is far and away the best work you've ever done. It's . . . well, it's magnificent. Definitely cross-over material. I've spoken to the publisher about putting it out on our mainstream list; break you out of the genre ghetto. Ken, we're talking best-seller here!"

Armitage half stood from the captain's chair, then he slowly lowered himself back down. "Best-seller," he repeated.

"Well, I can't promise, naturally. Only the readers can decide that. But it is as good as or better than anything that has hit the list in the last five years. I think you have finally found your voice."

"My voice." Armitage knew he sounded like a fool, echoing his editor's remarks. Still, the comment rankled some. He had six previous books out, and two of them had done quite well in the genre market. To be told that he was only now "finding his voice" . . . and on *this* book! "What were my other books, Ward, chopped liver?"

Ward blinked. "What? Oh, no. Don't think that." Writers were so temperamental. "But you must admit that you were learning your craft. If you don't improve with each book, then what? No, all I meant was that it has all come together with *Neural Life*." He patted the manuscript box in a paternalistic fashion.

Armitage shrugged. "To tell you the truth, I thought it read very stilted. Mechanical."

The editor smiled. "I sometimes felt the same way about stories of my own. Familiarity breeds contempt. Do you know what I liked best about your story?"

Armitage shook his head, but did not speak.

"The way you used neural nets."

Armitage scowled. He shifted in the hard wooden chair. "What do you mean?"

"You used them in three different ways. First, as the technology that linked the major characters together—you based their company on the Center where you work, didn't you? But you also used them as the structure of the plot itself, *and* as a metaphor for the interaction of the text with the reader. When I read that opening scene, I hated Justin."

Armitage nodded. "For shooting Melinda in the square."

"Yes, yes. It was a brutal and unprovoked act. I thought Justin was a sonuvabitch. But then, when the story cycled around to the same scene, this time from Francine's viewpoint, I felt . . . well, pity for him. Then, the third time . . . How many times did you replay that scene?"

"Six?"

"Six. Right. Each time from the viewpoint—and in the voice—of a different participant. And each time I felt a different emotion. Even elation, if you can believe it."

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"That was after you had learned that Melinda was the drug pusher responsible for the death of Justin's son."

The editor's head bobbed. "It certainly put a different light on things. Hell's bells. Each time I read that scene it was in a different light. To find out afterward that Melinda had been forced into the drug trade by her boyfriend's brutality . . . That made me ashamed of my earlier elation. When I finished the book, I felt like I had been on an emotional roller coaster. I was drained."

"And neural networks was a metaphor for all that."

Ward gave him a shrewd look. "You weren't aware of it yourself, were you? Well, they say the subconscious is the cleverest part of the brain. Sure, it was a metaphor. Look, how does a neural net computer work? You explained it in the book—and by the way, Willi over at our mainstream imprint thinks the explanation is clear enough for non-genre readers. You explained it in the book; just give me the recap."

Armitage pursed his lips. He rose from the chair and paced the room, pausing a moment at the copy editor's desk. The copy editor—Arlene—looked up, recognized him, and smiled. Armitage gave her a brief smile in return. Then he faced Ward. "No one knows how a neural net works. Not even those of us in the AI game. It just seemed like a more promising approach to the study of the human brain than the so-called 'expert' systems."

Ward nodded. "Go on."

"The basic idea is simple. You set up a collection of nodes—circuits that fire like the neurons in the brain. Based on the input from other nodes, each node 'decides' whether to fire—to send outputs to other nodes—and how strong those outputs should be. Of course, the actual connections among the nodes can be quite complex."

"There. You see? That's the plot structure. Each character in the story is a node in a kind of sociological neural net. Based on the inputs received from some characters, they decide to act on other characters. The architecture of neural nets permeates every scene."

Armitage cocked his head. "I hadn't thought of it that way." He returned to the captain's chair and sat with his hand on his chin. "What was the third level? I am morbidly interested."

Ward smiled. "That relates to what you told me about programming neural nets."

Armitage grunted without humor. "What we say at the Center is that you don't program a neural net, you teach it."

"Meaning, of course . . . "

"Meaning that we present a pattern to the input nodes and 'clamp' a desired output to the output nodes. Then we let the net fire. It compares its actual output to the clamped output and varies the signal strengths of the intermediate connections to obtain a better match. Eventually, it 'learns' the pattern well enough that it can even handle variations in the input. Terry Sejnowski's NETalk learned how to read English from a simple input text. The sentences were entered into the input nodes and the correct phonetic pronunciation was 'clamped' to the output nodes. After reading the same text over and over for about ten hours, the net was doing as well as any second grader. It even made the same sorts of

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mistakes. And the fascinating thing was that it read just as well when new text was presented. Somehow, it had discovered the 'rules' for reading." Armitage shrugged again. "And NETalk was a primitive net, with only a few hundred neurons."

Ward slapped the desk with his palm. "And there you have it! Your book takes the readers through six iterations of the same pattern, as they progressively learn what it means. It treats the reading audience as a neural net."

Armitage fingered his lip. "I . . . see. I hadn't realized that."

"What writer does? It wells up out of the subconscious. Otherwise we wouldn't need critics or English Lit departments."

Armitage did his writing at home, in a room that he had converted to an office. He stood there now and studied the array of equipment, touching each one briefly and gently. The trusty old word processor. The laser printer. Disk files and hard copy files. In the corner, gathering dust, an old Smith-Corona manual. He remembered those days; when pounding out a story meant exactly that. Somehow, it had seemed more like *writing* than it did now; certainly more than it would in the future.

The future occupied one entire side of the office, where he had knocked out the wall to the spare bedroom. A complex maze of optical fibers and microcomputers occupied that space, glittering in the sunlight that filtered through the shaded windows.

Armitage shoved his hands into his pockets as he contemplated the neural net. No one knew how a net arranged its synapses to attain its outputs. It did not apply rules, not in an algorithmic sense. After all, what rule did the human brain use to recognize the letter A; to recognize it in any size and typeface, in any handwriting? To recognize it even when partially obscured? The rules were there, implicit somehow in the pattern of synapses.

He walked to the bookcase and ran his fingers along the spines of the books that stuffed the shelves. Austen. Melville. Hemingway. Faulkner. Trevor. The raw inputs and the clamped outputs. Milieu, idea, character, event—laboriously analyzed, transcribed, and entered on the input nodes; and somehow, somehow, the net configured itself to match the story clamped to the output. What went on inside the net? He doubted that he could describe the connectivity of the system any more. It had grown too complex.

It was hard work to isolate the plot elements. To describe the characters and settings. It was writing of a sort. Research had always been the most difficult stage of the creative process. That was still his own, no matter that the net had learned to take any input and create a story from it. That part of it was only the donkey work, after all. The tedious hours spent staring at a blank screen. He had always hated that. His back always hurt and his eyes felt dry and red when he was done.

So it wasn't as if he had somehow automated the creative spark of writing. It wasn't that at all. Setting the inputs was the essentially creative act. It was the ideas that mattered, not the wordsmithing.

A best-seller, Ward had said. A cross-

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over book. Six books sweated out the hard way with little recognition save among a small clique of fans. Now, he had "found his voice."

Except it wasn't *his* voice, at all. It was the voice of a machine. The machine had found the words and the machine had put them together into brilliant metaphors and images; into crisp dialogue that crackled with irony. The machine had learned something by studying the works of the greats; some spark of genius that had always eluded him.

He turned abruptly and strode to his desk, where he yanked open the bottom drawer. He pawed through the screwdrivers and wirecutters and pliers that cluttered it, and pulled out a claw hammer. Then he approached the shining lattice, breathing heavily.

He cocked the hammer over his right shoulder. "You sunuvabitch!" he told the network. "What do you know about life? You aren't even alive! How can you write about it?"

He swung—but checked the swing half-way. He paused, took a deep breath, and swung again. But again, he could not follow through. The network glittered; light pulsed through its optical fibers as it stoically awaited his judgment.

He threw the hammer to the floor. He could not smash his net. It was not only a valuable research project—his "day job" at the Center, when he was not pretending to be a writer—but, it had, as Ward had said, a "voice." Dammit, that manuscript *had* been good. He could admit it. It was better than anything he had ever written before. Better than anything *he* had ever written.

* * *

"I can certainly see," the bartender said, "why you wanted to get drunk. It must be hell knowing that a bunch of chips and wires is a better writer than you."

Armitage pulled his face from his drink and glowered at the man. "It isn't that at all. Not that at all. I think I might have been able to live with that. No, it was something else."

"What was that?"

He slammed his glass hard on the counter top and the remaining liquor sloshed out over his hand. "*It won't even take the soul out of writing*. Don't you see? If a machine can create a story, the soul was never there to begin with. Everything we have ever called creativity was never anything more than a pattern of synapses in a neural net. Semiconductor net. Protoplasm net, it doesn't matter. We compare the outputs to the reactions of editors, readers, critics. Then we adjust the strengths of our connections to bring the output more into line. Somewhere along the way, we learned to call the process 'creativity' and we dared to think we were touched by the gods. Here." He waved the empty glass. "Call me a cab when I pass out. I'm going to drink until I forget why I'm drinking."

His hand shook when he lifted the refilled shot glass. "Here's to the human brain," he said. "We invented neural nets to find out how it worked. And now, God help us, we have."

The bartender shook his head. "I don't know anything about writing. I like a good thriller now and then, but that's about it. But I was told one thing about writing that I remember, and I

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guess this net of yours learned it pretty well."

Armitage stared into his drink. "What was that?" he asked without interest.

"You should always write about what you know." ■

IN TIMES TO COME

●Physicists and chemists have it easy, compared to astronomers. Most of their experiments can be planned, run on something resembling a schedule, and repeated to be sure the results are right. Astronomers have to make do with what Nature gives them, and Nature is frequently stingy. Suppose, for example, she gives you a supernova, a rare event that provides an exceptionally good chance to learn what makes stars tick—if you're ready to take advantage of it. Suppose further that you've invested a lot of energy and money in building a new kind of observatory on the Moon, it's almost ready to use, and something goes terribly wrong just *before* that supernova. There's no time to fix it right before the crucial early phase is over and gone—so is there *anything* you can do to avoid losing the once-in-a-lifetime opportunity? That's the dilemma faced by the folks in next month's lead novelette, Alexis Glynn Latner's "The Listening-Glass"—with cover, appropriately enough, by David A. Hardy.

We'll also have a colorful new novelette by Charles V. De Vet, set in the world of his well-known *Second Game* (which first appeared here as a novelette by him and Katherine MacLean in 1958); plus stories by Grey Rollins, Maya Kaathryn Bohnhoff, and Daniel Hatch; and a factual update on hydrogen as a basic fuel for civilization.

Finally, a reminder about a rapidly approaching deadline: Please don't forget to get your Analytical Laboratory votes for 1990 in before February 1!

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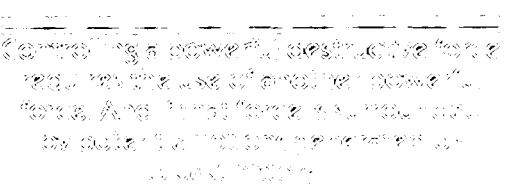

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The five week journey out from Earth taught me only one thing. Twenty-five years had taken the excitement out of space travel for me. When I was a graduate student going off-planet to research my dissertation, space travel was an adventure. Now it was just wasted time between here and there. I spent most of my time in my cabin, going back over every line of our operating program for the Trident experiments. My two research assistants quickly gave up trying to include me in anything. We met at meals and only rarely at other times, despite the restricted passenger accommodations. It wasn't until I got a call from Captain Linearson that I came out of the doldrums.

"Doctor Jepp, we're about to enter orbit around Trident. If you want a preview of the weather, you're welcome to come up to the flight deck."

"On my way." After all, the weather was the reason for this trip.

Trident has been notorious since its discovery a little more than twenty years ago. In many ways it's the most ideal of the several dozen Earth-like planets we've found. It has thousands of miles of prime tropical and sub-tropical coastline, lush lowland forests, scenic mountains, abundant wildlife, and all the rest. But the colonizers haven't struck yet. They're still waiting for the end of Trident's hurricane season. . . and it may snow in hell before *that* happens.

Beautiful hurricanes.

My trek up to the flight deck was slow and awkward. Now that we were back in normal space, we were back to zero gravity conditions, and I was having difficulty moving about. When I got to the flight deck and looked out, down was up, I had a moment of disorientation.

"Think it'll rain?" Captain Linearson asked with a laugh. After twenty-five years with the International Weather Service, I'm almost hardened to weather jokes. Almost.

"If it doesn't, I've come a long way for nothing." I looked out at Trident. The IWS had maintained a research team on Trident for the last eight years. We would have set up shop sooner but it took a decade to get general assembly funding and approval for the project.

"Well, there's your Angry Sea." The captain pointed out and "up."

Trident was hanging overhead—as far as I was concerned. The Angry Sea (that *is* the official name) was on the daylight side and dominated the visible portion of Trident. In media shorthand, Trident is called "the water world" as often as not. It's a misnomer. We've never come across a true water world, that is, one covered entirely by ocean. Percentage-wise, Trident has only 3 percent more of its surface covered by water than Earth does. But it is more concentrated. Earth has gone through similar periods in its tectonic history. Take Earth back to when the continents were just separating. Make the Atlantic Ocean 200 miles wide, allow for a few large bays and gulfs, call the rest of the water the Pacific Ocean and you have a decent idea of the makeup of Trident. The Angry Sea covers a huge chunk of the surface.

And it's always hurricane season. Trident's axial tilt is less than a third of Earth's, keeping the tropic and sub-

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tropic portions of the ocean warm enough for hurricanes year-round. I could see four of them at the moment.

"Am I going to be in your way here, Captain?"

"Not at all, Doc. Look as long as you want. We'll make one orbit before we deploy your satellites. On the second pass, we'll get you and your team into the shuttle and separate for landing. If the weather holds." She laughed but didn't look at me, so I was spared the necessity of any response to the joke. "Tim will take you down." Tim Andrews was at the other command console. He was a quiet man still in his twenties.

"Set you down without any trouble," he promised. "Even if it's raining." Another comedian.

"Captain, have you contacted the IWS station yet?" I asked.

"Just to tell them we're here. Anything special?"

"Flash them that canned message from IWS if you would," I said. Captain Linearson hit several keys on her console.

"Going down now."

"Fine, thanks. I'll make sure my people are ready to move out." The sooner I got away from looking "up" at the ground, the better my stomach would feel.

I never expected to be welcomed with open arms. Donna Elkins wasn't merely the director of the Trident Hurricane Study Center, she was its creator and driving force. Trident had become her career almost from the day we received the first reports on the planet from the survey team. The proposal for the HSC had been hers and she fought for ten years to get it approved and funded. She had been on Trident since the start of construction and, as far as anyone in IWS could tell, she intended to stay there until somebody wrapped her in chains and carried her off. There was little chance that she would be overjoyed to see me with my temporary writ superseding her authority.

But she was there to meet the shuttle when we landed.

"Doctor Jepp. It's been a long time."

"Doctor Elkins." I nodded and we shook hands. "It *has* been a long time." I had never really known her personally, but we had met at conferences now and then before she left Earth, and her single-minded drive to establish the research center on Trident had made her something of a "personality" in the agency. *Everybody* knew about her. She was forty-five years old now, according to her personnel file, and even though there was only a little gray showing in her hair, she looked much older—the sort of look that people get when they push themselves to the limit all the time. I knew her record. I made a point of studying it when I got approval for my finger-in-the-eye experiments.

"These are my research assistants, Jenny Evert and Ike Pappas." They nodded and there was more handshaking.

"We weren't expecting a ship for another seven months," Doctor Elkins said as we walked toward the electric van she had brought out for us.

"That ship should still be on schedule," I said. "We did bring some of the items you had on order though, what we could fit in. And we brought enough

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supplies to make up for the extra drain we represent."

I had trouble concentrating for a moment when I spotted an animal standing on top of the van. It stood three feet tall and might almost have passed for a monkey. This animal's fur looked like military camouflage, patches of olive green, dark brown, and tan. It had a broad face with large, slightly protruding eyes, a vertical ridge between them that was apparently *not* a nose, and a tiny mouth that didn't make sense until it unreeled a 15-inch long tongue. An insectivore.

"Part of the staff?" I asked, glad to have something light to ease the moment.

Doctor Elkins gave the creature an annoyed glance. "That's Mona. We call them chimps, or T-chimps, though Dov Marchiese gave them a full Latin classification. There's a whole troop of those things that hang around the center."

Mona stiffened and saluted. Behind me, Jenny and Ike laughed. I avoided sound effects, but I gave Mona a smile and returned her salute.

"Seems fairly intelligent," I said.

"Too smart to scare off, too stupid to know enough to stay away," Elkins said.

That was the extent of conversation until we reached the station's permanent buildings. *Permanent*: seventy-five miles inland, the weather could get much too fierce for anything less than nanofactured modules of grown diamond, silicrete, and steel-graphite composites. Under test conditions on Earth, the design had survived four-hundred mile per hour winds, the equivalent of eight inches of rain per hour for twelve hours, and impacts from weights of up to nine tons dropped from thirty feet.

Perhaps half of the station's people gathered to meet us when we reached the main facility. Doctor Elkins did the introductions, then assigned rooms for me, my assistants, and the shuttle pilot. There was a little chat. The resident staff had questions about home and any mail and so forth that we might have brought. The news that we had a bag of mail chips was welcome. Finally, the director steered me off to her office.

She slammed the door behind us.

"Now just what the hell is this all about?" she asked. Her voice was low, but there was no missing the intensity of it.

"I'm here to see if it's possible to kill a category five hurricane, Doctor Elkins." I said, just as softly, but without the tension behind my words.

"Forget that 'Doctor' crap, Roy. It's all first names here." That definitely was *not* a friendly invitation to a closer relationship. "What do you mean, 'kill a category five hurricane'?"

"Just that. After Hurricane Lisa hit the Florida coast two years ago, IWS has to produce more than long-term research reports from Trident. We have a new mandate to produce action rather than observation, technology rather than basic science."

"Political pressure." She said those words as expletives.

"Twenty-seven thousand people died in that storm, Donna. IWS lost nearly a hundred. More than two million people lost their homes. They still haven't totaled the bills. There are *still* a half-million people living in so-called 'tem-

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porary' refugee camps from Florida all the way up to South Carolina. What do you expect?''

''I *expect* nothing,'' she snapped. She turned away. ''But I think I *deserve* a little support from the agency. I can't run this project here and defend it day by day back on Earth.''

''I agree,'' I said. I did, in principle. But bending with the wind is more than another tired weather cliché. It's political survival. ''This is something beyond interdepartmental squabbling though. The general assembly has been making noises about the expenses here from the beginning, and since they're still looking for money to complete the recovery from Hurricane Lisa, they're looking hard at anything they can do to cut expenses elsewhere. 'Why spend all this money if we're not going to get anything practical out of it?' You know what it's like.'' I waited until she nodded before I continued.

''The Trident program would never have been approved without a lot of promises that it would finally make it possible to *do* something about tropical cyclones. Promises *you* made.'' I waited for another nod.

''Hurricane Lisa merely brought it to a head.'' I shut up until she turned to face me again.

''It's put up or shut up time, Donna,'' I said, as sympathetically as I could manage. ''To be a little more precise, it's put up or shut down. And I want to keep Trident HSC going as much as you do.''

For an instant, a haunted look got past the anger on her face. Then the anger returned, stronger than ever. ''You can't do basic science on a timetable.''

''They don't want basic science. They want usable technology.''

''Basic research was the whole purpose for this station. Given time, we can learn more about cyclonic weather than anyone ever imagined. We *need* the basic research before we start thinking about technology to control hurricanes. We're not set up for that sort of task.''

''That's why I'm here. We brought along everything we'll need for our experiments.''

''And if they don't work?''

I took a deep breath before I answered. ''In that case, when the regular supply ship comes in seven months, it will be to close down the project and take you all home. But if they do work, we'll be long gone by then and your project will continue.'' Our ship would wait in orbit to take us back to Earth when we finished.

''I won't leave.''

''You won't have any choice. You're not self-sufficient here and you can't make yourself self-sufficient in seven months.''

Round one. ''That went better than I expected,'' I mumbled when I got to my room. Of course, I hadn't said anything about the actual nature of the experiments I had come to conduct. I knew damn well that the real argument wouldn't start until Donna Elkins found out what I was planning to do on Trident.

There was little noteworthy about the arrangement of the buildings that housed Trident HSC. The long, low, narrow modules were linked together like so many dominoes, meandering about a clearing that was a kilometer

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across. The trees that had been felled around the center had been pruned and used as extra bulwarks around the perimeter. At the edge of the clearing a series of large bunkers had been excavated from the side of a hill to store supplies and equipment, and to serve as hangers for the center's aircraft and the odd orbiter that might be on the ground for a day or two while a ship was in orbit.

Everything about the center was utilitarian, Spartan. My room was a cubicle ten feet square and eight feet high. There were no windows. The bed was a simple, uncomfortable cot. There were two tables and two chairs. One table held a computer terminal. The other table was empty.

I sat on the bunk and leaned back against the wall. I was more tired than I had any right to be. The return of gravity after a few days without any wasn't excuse enough. I reveled in having weight and a proper orientation to 'up' and 'down' again. I suppose I was wasting energy dreading the arguments yet to come. Confrontation has never been my style. I just sat there and fretted until Jenny and Ike came to report.

"Everything is in the bunker," Ike said. "It hasn't been opened." The "everything" in question was the shuttle cargo module with our experimental gear. Our module had made the trip out from Earth in the hold of the ship's main shuttle. The unit had been designed to use every cubic centimeter available in a lander bay. It would take two more shuttle trips to bring down the food supplies and other things we had brought for the center.

"Dinner will be in just a few minutes," Jenny said. From the way she looked at me, I could tell that she was worrying about my health and well-being again. Jenny had clucked over me like a mother hen since she joined the project twenty-one months before— despite the ribbing she took about being so old-fashioned. Sometimes I think Jenny figures that I'm as old as Methuselah and incapable of taking care of myself. Well, since we had started preparing for this trip, I had occasionally felt that old, so maybe she had just cause.

"I think I can hobble as far as the dining room," I said, getting up while Jenny had the grace to blush. "Remember, it's going to be a long haul here." I looked from Jenny to Ike. I had lucked out in my choice of assistants. They were both conscientious and highly qualified. The data we collected on Trident would provide the final elements for both of their dissertations.

"Just how do you plan to kill a hurricane?" Doctor Elkins asked when I went to her office the next morning. The obvious anger was gone—suppressed at least—but I could still see the tension in her face.

I leaned back in the chair across from her. None of the furniture at the center seemed to be designed with any thought for human comfort.

"I'm not going to jump right in with anything," I said, postponing the moment. "I want to take a few days to familiarize myself with both current and historical storm tracks, take a couple of survey flights over the Angry Sea, run some additional measurements."

"No runarounds, please? You have

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your killer experiments ready. You know what you're going to do."

I nodded. "There aren't that many possibilities. We're going to try atmospheric compression—finger-in-the-eye stuff. We're here to run a series of experiments to see if it can be done and what the minimal force levels might be."

"Atmospheric compression?" The disbelief was clear in her voice and on her face. I might as well have told her that we were counting on Santa Claus to do the job.

"Disrupt the tight pressure gradients around the eye," I explained. "We've worked up computer simulations that show that it may be possible to destroy the hurricane by disrupting the eyewall. Compression and rebound."

"You can't be serious. You know as well as I do how much energy a major hurricane carries. There's no possible way to counteract that."

"We don't have to equal the total energy of the storm," I said. "That *would* be impossible. Our approach is a little different. Our simulations show that it might be possible to cause sufficient disruption by the precise application of considerably less than one percent of the energy carried by the storm. In fact, the stronger the storm is, and the more strongly defined the eye is, the easier it should be to tip it into chaos, causing the storm to self-destruct. The idea is to use the storm's own strengths against it, make it work against itself." I shrugged. "There's always some uncertainty about deterministic chaos," I conceded. "If we were absolutely certain that it would work, we wouldn't have come all the way to do the field tests."

She didn't respond to that immediately. Concentration pushed aside the anger on her face as she tried to imagine what I might have in mind. The basic idea wasn't new. It had come and gone as a topic of discussion for ages. Until Hurricane Lisa wrecked the Atlantic coast of Florida from Biscayne Bay to Fort Pierce, then regrouped to come back ashore in North Carolina, the idea had never gone beyond idle chatter and the roughest of preliminary work-ups.

Finally, she put the look of concentration aside.

"I hope you're not going to disrupt our routines too much as well," she said. "Particularly if we may be running out of time. We *do* have our own ongoing projects, research that may do more long-term good than this political knee-jerk show you've got."

"At least until we run our active experiments, any disruption should be minimal," I assured her. And, no, I wasn't offended by her characterization of our experiments. They *were* a "political knee-jerk show." But I did think we had a real chance of success. "We'll be spending a lot of time at computer terminals, of course, and I'll need some air time in one of your aircraft. And we'll need a survey plane for the actual experiments, when the time comes. Oh, in case you haven't noticed yet, we've strung a few extra satellites to increase the coverage of the ocean. That data will all be available to your people as well. Jenny has all the access codes and orbital data. And after we finish, the satellites will still be there to increase the

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amount of data your people have to work with."

"I want plenty of notice before you go messing with any storms," Elkins said. "At least forty-eight hours. I want to make sure that my people are well out of the way."

"We'll work something out," I said. "But if you insist on forty-eight hours, you might have to pull people on a few scrubs. We have tight test conditions to meet, and a storm might stray beyond our limits in forty-eight hours."

She started to say something to that, but stopped by biting at her lip.

"We'll work something out," I repeated.

In the eight years of the Trident HSC, there had never been a single minute without at least one hurricane on the Angry Sea—and the times when there were only one were rare enough to count on the fingers of one hand. The average number of hurricanes and tropical storms on any given day was slightly over three. Five at a time wasn't rare, and the record was eight. I had studied all but the last seventeen months' activity before we left Earth—all that had been received up to that time. When I got back to my room after that session with the director, I sat at the computer terminal and called up the storm track program.

The holotank built its model layer by layer, up from the sea floor, through the surface, to the lower levels of the stratosphere. I could watch a horizontal view or toggle over to the overhead view, cut a cross-section to throw on one of the flat data screens that flanked the tank, get any data I needed on the other screens. The scales were adjustable as well—physical dimensions and time. The first time through, I ran the seventeen months in seventeen minutes, sitting on the overhead view, watching the hurricanes form and plow their courses across the Angry Sea. Most ran into the bulge of the coast. Some turned north, missing land, finally dying out in the empty northern reaches of the Angry Sea.

Generally speaking, the tropical cyclones rose in one of two large, regularly defined areas, one south-southeast of the IWS station, the other east-southeast, and 3,000 miles away. The largest and more durable storms generally came from the eastern crêche.

Trident offered what seemed to be an infinite variety of patterns with its hurricanes. The fact that there were almost always several tropical cyclones moving across the Angry Sea provided opportunities that meteorologists could scarcely dream of on Earth. Occasionally, a series of hurricanes would follow each other west and north in a conga line, spaced between eighteen and thirty-six hours apart. At other times, two storms would merge. I found those episodes the most heartening. Eighty percent of the time, merger spelled the end of both hurricanes. They disrupted each other chaotically and spiraled back down through tropical storm and tropical depression within a matter of hours. —Of course, the remaining one time in five, the storms *did* merge into a storm more powerful than either of the antecedents.

I ticked off bookmarks for each of the merger events in the past seventeen months and keyed them to the attention

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of Jenny and Ike. They would make the precise measurements we were interested in. Jenny came to my room just as I was loading up the storm track sequence for a second play. I was going for a scale of ten seconds per day this time.

"How soon do we get to look at some of these super hurricanes?" Jenny asked.

"Any in particular you'd like to look at?"

"There's a category seven about nine hundred miles out that looks interesting." *Category seven.* On Earth, the Saffir/Simpson Damage-Potential Scale only goes as far as category five—winds over 156 miles per hour, storm surge over 18 feet—but that catch-all top end was ridiculously insufficient for Trident. The Elkins team had added three extra categories at the top.

"We're not here as tourists, Jenny."

"Come on, Roy." I had insisted on the first-name basis almost from the start. I hated being called "Doctor Jepp" or "Professor" all the time. "You want to see the big ones as badly as Ike and I do."

I grinned. "I confess. But does this category seven give us a chance to look at a four or five en route?"

She grinned back at me. "There's a category five about to hit the coast 250 miles northeast of here tomorrow afternoon."

"OK, I'll try to book us a flight."

Back home, I teach a graduate seminar at American Regional University in Washington and I give eighty or ninety talks and lectures to various outside groups each year. Public relations is a large part of any researcher's job, particularly in a government-sponsored agency. People always want to know why weather forecasts aren't more precise than they are and why—with all the time, money and effort that have gone into studying weather and climate—the forecasts are sometimes dramatically wrong, even for the next twenty-four hours. And people have a fascination with the most dramatic expressions of weather, the killer storms, tornadoes and tropical cyclones—hurricanes and typhoons.

Even after nearly a quarter century with the International Weather Service, I still find myself constantly amazed that most people, even highly educated people, think of a hurricane as nothing more than a big rain storm. Five or six years ago, I gave a talk in Indianapolis. During the question and answer session afterward, one chemistry graduate student tried to get at the nature of hurricanes with a sports analogy. "I mean," he started, "so an afternoon thunderstorm is sort of like Saturday club soccer, right? And a big hurricane is like the World Cup final?" I hid my instinctive grimace and tried another explanation of the driving mechanism of hurricanes. I had already gone through it once, but I drew my analogies down a notch and started over.

Basically, a hurricane is an immense furnace, a heat-driven engine. It requires hot, moist air, low barometric pressure and rotational momentum. Winds spiral inward—from high pressure to low pressure—pulling moisture and warmth from the ocean's surface. These are concentrated in the eye, with the energy being pulled up along the eyewall in a chimney effect and redis-

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tributed at the top. Rob a hurricane of its heat or its influx of moisture, and it dies. Tropical cyclones weaken and die when they hit cold water or move over land. The longer they stay over warm tropical water, the longer they last, and the stronger they can get. And Trident had more room for them to grow than Earth.

Donna Elkins didn't make even a ritual protest at my request for a plane for the next morning, but she did insist that one of her people go along to check me out on the craft. That was fine with me. I've never been a full-time pilot, and obviously I had never flown around a category seven hurricane.

The pilot's name was Kasigi Jo, but he insisted on being called Casey. He sat at the right-hand controls of the six-seat Imre survey plane and watched me and the instruments.

"This flight's yours unless you screw up or ask me to take over," he said before we took off. "Your log shows you have more than 2,000 hours of instrument time. That's more than I had when I came here." Casey took his job seriously. He had examined my log chip before we went out to the plane.

"Maybe, but it appears that your reflexes have about ten years on me. And you've had flight time here. Don't be bashful about suggestions."

"I won't. My favorite neck is aboard this plane."

The ink had still been wet on Casey's Ph.D. when he left Earth for Trident eight years back. And unlike Elkins and a few of the others, he didn't plan to make Trident his entire career. He was already scheduled to return to Earth on the next regular ship. "I promised them eight years when I signed on," he said while we flew toward the coast. "They're getting a few extra months as it is."

"You staying with IWS?" I asked as we leveled off at 35,000 feet. We were crossing the coast, south and a little east of the center, banking through a gentle turn to eventually bring us up on the category seven from behind.

"Nah. I'm going into broadcasting. I've already got three offers, two in Tokyo and one in Jacksonville. They came in with the mail you guys brought. First nibbles."

I made a slight change to our flight plan. There was a new storm just starting to develop a distinctive eye in the western crêche. The side trip would only add twenty minutes to the flight, so I took it. And even though I hadn't done any flying in a year, the feel came back quickly. The Imre 370 virtually flies itself.

"Not bad," Ike said as we crossed the boundary of the eye of the new storm. "It tripped across the scale from tropical storm to hurricane just as we entered."

"I didn't do it," I said with a soft laugh.

As we left the new hurricane behind, I took the plane up to 45,000 feet, mostly to pick up a little speed, partly to get a broader look at the ocean. We had a little over an hour and a half of flying left to reach the eye of the category seven.

"So tell me, Casey," I said as I let the autopilot take over, "what's Trident like?"

"Where do you live?" he asked. The return question surprised me.

"Southeast Georgia. Halfway be-

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tween Savannah and Jacksonville, and about twenty-five miles inland."

"Oh. You ever live in one of the megalopolises?"

"I spend a lot of time in Washington," I said. At least one day a week, one semester a year. I commute to the old capital to conduct my seminar."

Casey shook his head. "That's just at the edge."

"I get to most of them, now and again," I said. "What are you getting at?"

"I grew up in Tokyo. Choose any ten meter square in the entire city and it has more people than the entire planet of Trident. This is heaven."

"But you're thinking of going back there?" Jenny asked.

Casey shrugged, then laughed. "They don't have much use for typhoon experts in the Gobi." He had a point. Tropical cyclones are only a problem for specific areas of Earth—the east coast of North America, the Caribbean, the western Pacific, and the Indian Ocean.

"You'll have a hard time finding low population densities anywhere they need your expertise," I said.

"Ain't it the truth."

Even with an airspeed of 570 miles per hour, it took us more than 30 minutes to cross the trailing radius of the category seven hurricane and reach the eye. At 45,000 feet, we were skimming the cloud cap and fighting the outward spiral of air from the top of the chimney. Conversation damped down to the essentials. Casey paid closer attention to the flight instruments and read off anything he thought I needed to know. I focused on the basic of keeping the wings level and our altitude steady. There was enough turbulence to ensure concentration. Jenny and Ike were busy studying the storm. The survey planes were equipped with storm-monitoring equipment, and they were trying to keep tabs on everything at once.

"Hey, kids, forget the instruments for a while," I said as we neared the eye. "You can stare at those later. Look at the real thing while you can." Neither of them had ever flown in or over a hurricane before—or been in one on the ground for that matter.

Far from looking sinister and threatening, the cloud cap was a thing of awesome beauty from above. As close as we were, the stratification wasn't quite as noticeable. Except for the extent of the clouds below us, we might almost be skipping across the top of fair weather cumulus. The plane's windows had polarized enough to offset the glare of the sun off the top of the cloud deck, but not enough to mar the scene.

"You'll have a strong updraft when we cross the eyewall," Casey reminded me. "I mean *strong*."

I nodded. "We'll go through that and circle down inside." Once we got past the strong updraft right along the eyewall we would find gentler downdrafts through most of the clear space at the center of the storm. "Any thoughts on a safe minimum altitude inside?"

"Depends how good your nerves are." Casey met my gaze when I turned to him. "Generally speaking, an eye this well-formed will be fairly calm, but there's always a chance for serious shear."

"How about you? How low would *you* feel safe?"

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"Since I want to go home, I probably wouldn't go below five thousand."

I nodded slowly. "Five thou it is."

If you could harness all of the energy wrapped up in one storm that size and put it into a spaceship, you'd have the most powerful rocket ever. This storm had *sustained* winds of 219 miles per hour. If it hit land without weakening, the storm surge would top 30 feet.

It was magnificent.

The updraft at the eyewall carried us up a thousand feet like an express elevator before I compensated. Then I kicked the plane into a slow clockwise spiral down into the eye—clockwise, against the rotation of the storm. The eye was thirty miles in diameter, not quite a perfect circle. The sun brightened a considerable portion of the ocean surface below. The eyewall was regular and well-established, tiers of clouds extending all of the way down to the sea, the slight hourglass curve hardly noticeable.

We had scarcely started our descent when I heard a soft, "Oh, my God," from Jenny. I glanced back just long enough to see that she had her face plastered against the window to her side. Ike was staring out past her, just as intently.

"A little different than seeing it on a screen or in a tank, isn't it?" I asked. If I hadn't been so intent on the plane, I would have stared that way myself.

"It's so . . . so *immense*," Ike managed after a moment.

I chuckled. Ike and Jenny were both graduate students in meteorology, specializing in tropical cyclones, and they could still get that excited. So can I. It helps to get that involved in your work. It keeps it from being nothing more than a job.

We spent nearly ten minutes at our slow descent, circling around the clear eye, staring out at the almost eerily regular tiers of clouds that marked the eyewall. It wasn't *just* wasteful sightseeing. The survey plane carried a lot of weather instrumentation, and it was all running. Trident had too many hurricanes and too few researchers to get thorough data on every tropical cyclone that made its way across the Angry Sea.

"Getting close to five thousand," Casey informed me casually—with five hundred feet to spare.

"OK. Going up." I banked us around into the updraft closer to the eyewall and we took a real elevator ride to the top. Five thousand feet above the cloud cap, I asked Casey for a course to the category five and locked onto it. Then, as soon as we were away from the eye, there was time to relax a little and get back to normal breathing.

"Wow!" Jenny said—some ten minutes later. It was her first word since early into our descent.

The category five storm wasn't quite as broad as the category seven. The eye was also narrower, though just as sharply defined. I didn't bother to take us nearly as deep into that one. We went down to 20,000 feet and took a couple of laps while the instruments recorded what they could. Then we climbed out and headed back for the center.

"It's pretty close to the stats on Hurricane Lisa," Ike said as we crossed the cloud cap of the category five. "Size, sustained winds, pressure gradients—all within a couple of percentage points."

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"They come in six packs here," Casey said. "At the moment, it's only the third largest active hurricane we're tracking."

"And Lisa was the most powerful ever recorded in the Atlantic," Jenny said.

"We've gone to the top of category eight on the modified Saffir/Simpson and we think that category nines must occur occasionally," Casey said.

I wrote that first full day on Trident off as acclimatization and told Jenny and Ike to take the rest of the afternoon to themselves after we landed. The weather had taken a turn for the worse at the center. A line of squalls was moving in. It had already started sprinkling and heavy rain was only minutes away.

Ike and Jenny went on toward the living quarters as soon as we landed. I stayed out with Casey to go through the post-flight checklist on the plane. As we finally started for cover ourselves, I spotted several of the local chimps capering about—running along the roofs of the center's buildings, jumping to the ground, then scampering back up.

"They always carry on like that?" I asked.

Casey laughed. "They get a little crazy when the barometer dips. The lower it goes, the wilder the chimps are. They're sensitive to weather. A lot of the wildlife is, even this far from the coast."

"Makes sense," I said. "As extreme as the weather gets, knowing when heavy rain and storm winds are coming would be a definite survival advantage."

"No scoffing at all?" Casey asked. He looked as if he were genuinely surprised.

"None at all. Just don't tell me that your corns hurt when a big blow's coming." We both laughed. Casey didn't seem the least bit put out by the arrival of "big guns" from Earth.

Unfortunately, he was in a minority in that regard. Most of the members of the permanent staff seemed to share Donna Elkins's resentment of me, my assistants, and our overriding authority from IWS headquarters. Our reception was generally very cool. I didn't expect it to get any more cordial once the exact nature of the work we were on Trident to do become known.

Halfway through my second morning on Trident, Doctor Elkins knocked on my door and came into the room after barely waiting for any reply.

"I've been running some simulations," she said without any preliminaries. I nodded. I had assumed that she would. "What kind of explosives are you planning to use?"

"Tri-thermolite-four initially," I said. I turned my chair away from the computer terminal and leaned back. TT4 is the hottest, most powerful chemical explosive known, and we had forty tons of it.

"Initially. And when that doesn't work?" She didn't say "if," but "when."

"*If* that doesn't work, we'll go to hydrogen fusion devices," I said, still calmly.

There was no sudden, emotional outburst from the director. She had run her simulations. The answer was too obvious for there to be any surprise. She

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stared at me for a moment, then took a deep breath.

"I thought that must be the answer," she said. The tension was back in her voice, more obvious than before. "It had to be, even if it still doesn't make sense." She shook her head. "My first thought was that you can't be serious . . . but you wouldn't have come out here if you weren't."

"That's right," I agreed when she paused.

"But still, I can hardly believe it. No one has exploded a nuclear weapon in more than a century. It was against the law the last I remember. And what I really can't—*don't*—believe is that anyone would permit it back on Earth, even in the unlikely event that it would kill a hurricane."

"A few years ago, you would have been right," I told her. "But you've been out of touch. After Hurricane Lisa, people would accept *anything* that could prevent a repeat."

"And you're going to contaminate an untouched world just to try out this crazy theory of yours," Statement, not question.

"It's not crazy," I said. "And contamination will be minimal. The devices we have are nanofactured, as clean as possible. There will be some immediate radiation, of course, but little long-term contamination."

"Not to mention killing a lot of aquatic life," Elkins said, as if she hadn't even heard what I said.

"It's not as if Trident had any sentient life forms." Yes, I *know* how callous and cavalier that sounds. But there are always trade-offs. And most humans still rank their welfare above that of inedible wildlife on a distant planet that is too wild for colonization to be an immediate prospect.

"We haven't been here long enough to rule out the presence of native sentients. Eight years! And that hasn't been our primary purpose even. At that, those chimps might come close to some definitions of sentience."

"I know all the arguments," I said. "All the 'ifs, ands, and buts,' and it still doesn't alter a damn thing. Stacked up against the deaths, injuries, and property damage of Hurricane Lisa, it doesn't mean a damn thing. As soon as we're ready, we start the TT4 experiments. And if those don't work, we go on to the fusion devices."

Doctor Elkins bit her lip so hard that I saw blood, but she didn't say anything else. After a moment, she turned and left. I punched up the intercom channel on my terminal and called Jenny.

"I want you and Ike in here, right now," I said. It was time to talk about security measures.

Even though you can't control experimental conditions as completely in the field as you can in a laboratory, you have to set tight standards. *This is acceptable. That isn't.* The narrower your parameters, the more reliable your test data will be. And even then nature can come up with a surprise that might destroy the validity of your experiment.

We needed data that would be applicable to conditions on Earth. We needed storms that were category five and threatened land, but right off the bat I ruled out using any tropical cyclone that reached category six or higher at any point in its career. I also ruled out daisy-

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chained storms—and *that* cut seriously into the available test population. There was a chain of three hurricanes dancing across the Angry Sea when we arrived on Trident. Our experiments also demanded storms that had strong and clearly-defined eyes. And, to protect the integrity of our test data, we ruled out any storm that showed any sort of maverick activity, any anomalies that weren't routinely observed in hurricanes and typhoons on Earth. Other than that, any storms would do.

Ike and Jenny did the first tag on storms, tracing them back to their formation and logging all the available data—data that became better for storms that brewed after our new satellites were operating. I reviewed the storms that my assistants logged, ruled out about half right away, and followed the rest.

We had been on Trident eleven days before I finally picked a storm for our first test.

"Isolate the trace and double up the satellite coverage," I told Jenny. From that moment on, Trident tropical cyclone SSE-14-42 would be under the microscope. Until the storm died, whether as a result of our interference or on its own, we would draw every possible bit of data from it. I had already called Donna Elkins to tell her that we had our first candidate.

"If it stays good, we'll take off at dawn, day after tomorrow, deploy and push the button as soon as we can." That was what I had told Elkins, and that was what I told my assistants. "Ike, let's take a look at our birds."

We walked. That was as close as we could come to being sure that we wouldn't be overheard. The center didn't have a lot of equipment for eavesdropping, but wherever you have radios and computers, you have the potential.

"Have you picked up even the slightest hint that anyone might try to stop our experiments?" I asked softly, once we were well away from the main complex of interconnected buildings.

"Nothing," Ike said. "I guess everyone knows what we're here for by now. It's no secret. I hear a little now and then. Mostly nobody thinks that our experiments can possibly work. Some resent us. More, they resent the threat that our failure means that the center will be closed down. They don't like what we're going to do, but they like what will happen if we fail even less." After a long pause, he added, "Casey stopped talking to us when he found out about the fusion devices. He won't even answer if Jenny or I say something."

The sky over the center was brilliantly clear. The temperature was 85 but there was a delightful breeze from the northeast. Despite the frequency of tropical storms, Trident isn't *always* a wet and gloomy place, not even the stretch of it that sits in the path of most of the hurricanes.

"I almost wish there had been some way to hide the fact that we're going to use fusion devices, if need be, until the last minute," I said. Casey had walked out of a room just because I entered—a couple of times. I felt bad about that. I had liked Casey when we met. "But anyone who spent a few minutes running the calculations could guess it." Anyone likely to be working at the Trident Hurricane Study Center, at least.

There *was* one other possibility, but it was even more exotic—and therefore

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less likely. One of the proposals we had investigated had called for deploying a series of large mirrors in orbit to concentrate sunlight on the center of a hurricane. In theory, it would be possible to concentrate more energy that way, but the process would be slower than explosive compression (if *that* worked), and it would be much more expensive and complicated. And, in the case of Earth, it probably wasn't feasible. There's simply too much garbage orbiting Earth after two centuries of space exploration and travel—all the way out to geo-stationary. Mirrors large enough to do the job would be ripped apart by the flotsam and jetsam long before they could manage the task.

"Well, they can't get into the module," Ike said. "And I can't see them doing anything melodramatic like sabotaging a plane to keep us from finishing."

"It's possible that they would simply cut off our access to the planes and computers," I said. "Maybe even confine us to our rooms."

"They couldn't get away with that!" Ike protested.

"No, but they could stop our experiments. Elkins and enough of the others might be willing to take that chance."

"I don't get it."

"History," I said.

For the moment, that was where the discussion ended. A troop of the local chimps spotted us and came charging across the clearing. With them chattering and bouncing around, there wasn't much chance for Ike and me to continue our talk. But they were a welcome distraction. I couldn't distinguish among the T-chimps, so I didn't know if Mona was with this group. I *could* see differences in the color patterns between different chimps, but I didn't know them well enough to identify individuals the way Elkins and most of the permanent staff could.

When Ike and I reached the supply bunker that held the shuttle payload module with our equipment, the chimps broke off their play and ran back toward the center. Evidently, they knew they weren't permitted in the bunkers.

I keyed in my password to the main door. Then Ike keyed in his. I had used my authority to commandeer an entire bunker. The door needed any two of three passwords. Jenny had the third. The module we had brought along was protected by a similar two-of-the-three password arrangement, but in that case, one of the two had to be mine. Security.

Once we got the bunker open, I dug out the electronic log I had put into the lock mechanism to make sure that there had been no attempts to enter. The log was clean. I reset and replaced it.

"We might as well haul out the first set of sleds," I told Ike while we were unlocking the payload module. It had been taken out of the shuttle and stored the afternoon before. Ike nodded as he finished keying in his password.

"I'll get on the manipulator," he said.

Our Manta air sleds had been considerably modified for our experiments. To give them enough payload capacity for our largest explosive loads, we had to strip off a lot of their standard maneuvering and navigating equipment. They were set to maneuver expressly within hurricane eyes, looping clockwise along the eyewall. We could adjust the di-

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ameter of the loops within limits, but that constant right bank and sufficient leeway in climbing and descending were the only maneuvers those sleds were capable of. They had to be dropped into the eye from directly overhead. There was no chance of sending them off to find their places from a distance. They no longer carried enough fuel for that, even if we hadn't limited their maneuverability.

Ike got the top of the module opened with the bunker's manipulator— something more than a simple crane, much more flexible—and lifted the first four air sleds out one at a time. *Very* carefully. Each of these sleds held a ton of TT4. The next four held two tons, the next group three, and then four tons. If four sleds, each carrying four tons of TT4, didn't provide enough force to disrupt a category five hurricane, we would go to the last set of sleds. Each of those carried a seventeen megaton fusion device—the largest we could squeeze into an air sled. While it might have been more logical to cut down on the number of TT4 trials and include a second set of fusion devices in the moderate kiloton range, logic isn't always the dominant force when science and politics meet.

Ike set the first four sleds in a row down the center of the bunker. Then he came back from the manipulator and we locked the wings down on each of the Mantas, and ran the full list of pre-flight checks on each of them. Next Ike ran a hands-and-eyes check on each sled to make sure that there was nothing wrong that wouldn't show up electronically.

"Ready to go," he said when he finished with the last one.

I nodded. "Let's put new seals on them and then run the electronic tests on the rest of the sleds while we're here." That took us another ninety minutes. We didn't find anything out of order. I hadn't expected to. No one else had had access to the sleds since they were packed on Earth, and I had run a check on them before locking the module.

"We'll put the first four aboard the plane tomorrow afternoon. I'll tell Doctor Elkins that we have to have it then."

I had managed a couple of short flights in Imres during the days of waiting for a suitable storm to appear, so I wasn't nervous about handling a survey plane. At the altitudes we would be at, there was really little to worry about, even flying into the center of a category five hurricane. We wouldn't go down into the eye this time. Ike and I would drop the air sleds from above, guide them into position, and head back toward the research center. Jenny would monitor the results from there.

After we loaded the sleds in the drop hold, Ike spent the night in the plane—his idea, not mine. At that, he may have spent a better night than I did. I didn't sleep well at all. I shared many of Doctor Elkins's reservations about the possible success of our experiments, at least the TT4 runs. If we killed a hurricane with chemical explosives, it would be a fluke. But we had to start with those tests.

It was raining over the center when I got up in the morning and drove over to the landing strip. A category three had come ashore to the south during the night and it was quickly losing strength,

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fizzling away in scattered showers. Ike was already up and running another equipment check on the sleds when I climbed into the plane.

"I wondered when you were going to get here," Ike said, grinning. I just shook my head. The computer terminals showed the portions of the Angry Sea we had to worry about. "Our" hurricane was marked in contrasting colors to make it easier to watch. A quick glance at the data screen showed me that it hadn't changed character in the twenty minutes since I had left the terminal in my room.

"We're set to go," Ike said, brushing his hands off on his coveralls. I nodded and moved up to the pilot's seat.

We worked our way down the preflight checklist. I was very careful about that, going down the list item by item. That was one thing about a long lay-off from flying. It made me more cautious than I might have been if I flew regularly. But the list of manual steps was fairly short, mostly a series of checks of the plane's electronics and mechanical connections. The Imre's own diagnostic programs handled most of the work.

The two jets fired up quickly and checked out perfectly. We had a full load of fuel. Hydraulics were in top condition. So was everything else. There wasn't anything even close to yellow on the readiness scale.

"Let's go," I said when we finished the list. I taxied the Imre away from the bunkers and turned into the wind before I cranked the jets around for a 45-degree take-off. There was no real need for the STOL start. I'm just more comfortable with that on grass.

The flight was uneventful. That's how I like all of my flights. Jenny was on the radio with us almost continuously. Twice, Donna Elkins broke in to ask nonessential questions—mostly to let us know that she was keeping tabs on the operation. I didn't ask, but I figured that there was a good chance that most of the permanent staff were where they could keep track of what we were doing. It didn't matter how they felt about our experiments. They knew that their future on Trident rode with them.

I let Ike spell me at the controls for part of the flight. He had his pilot's license, but not a lot of hours. Giving him a shot at the controls let me stretch my legs a little . . . and run a last check on the air sleds before we deployed them. That was just nervousness. We had no margin for botched runs.

"Ten minutes," Ike reported as I strapped myself back in the pilot's seat.

"We're ready." I looked to make sure that Ike was strapped in. While the hold doors were open, we would be slightly more vulnerable than at other times. "Oxygen masks," I said. The cockpit was pressurized separately from the hold, and I had sealed the hatch between them when I came back, but it was a matter of not taking any unnecessary chances.

We dropped to 40,000 feet, just above the top of the cloud cap, to release the air sleds. The center's Imres were all equipped to launch the Mantas—the basic design was used as a standard weather service probe. The sleds slid out smoothly, one at a time. Each sled's jet fired up when Ike hit the hot buttons. While I closed the hold door and turned us to our return course, Ike was busy

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juggling the four sleds, guiding them into position. We wanted the sleds spaced at 90 degree intervals, just over the slight inner bulge of the eyewall. For this storm, that meant at 18,000 feet. It took fifteen minutes to get all four sleds positioned properly with their jets keeping them on station.

"Jenny, give us five minutes from now, then fire them," I said as soon as Ike confirmed that everything was set.

"Counting down," Jenny replied. A repeater on the data screens in the cockpit flipped over to show the time remaining.

I cut the microphone before I told Ike, "We'll need more time than that before we do the fusion run." I didn't want all of the eavesdroppers to hear that. If Elkins and the rest knew that I was so certain of going on to the fusion devices, it might add to the hassles.

We were 160 miles in front of the eye and 5 miles above the sleds when Jenny touched off the TT4. We lost telemetry from the sleds at once but picked up the reports from the lowest of the tracking satellites. All four packages exploded precisely on schedule. The satellite picked up the flashes, and the pressure wave around the disintegrating Mantas.

And that was all. Any effect on the hurricane was minimal and transitory. Within seconds, there was no trace of any change.

"Well, we didn't *expect* anything from the first run," Ike said softly, his hand over his microphone, but I could hear disappointment in his voice.

"Not even a *hint* of any effect, not the slightest encouragement of eventual success," Donna Elkins said. At least she hadn't been waiting for us at the landing strip. It wasn't until after supper that evening that she asked me to step into her office.

"It's too soon to say that," I replied, probably just because I was feeling too stubborn to concede anything to her yet. Supper in the communal dining hall had been trying. The staff still did its best to ignore us, but they didn't try to hide their various reactions to the day's run. A few showed what may have been genuine regret, but I saw too many gloating smirks to feel very agreeable.

"We're still examining the transients we got immediately after detonation," I continued. "In any case, today's run was just the first—minimal load, minimal expectations. We couldn't afford to do a dry run without explosives. And today's results, minimal though they were, will give us a starting point when we start calibrating results for the series."

"You intend to continue?" Donna asked. There was no surprise in her voice. She just wanted confirmation.

"Of course. As a matter of fact, we've already isolated a likely candidate for our next run. Unless it turns out to be unsuitable, we'll hit it about noon, local time, three days from now. I'll key the data to you as soon as I get back to my room. More than forty-eight hour notice."

"In case you're interested, nobody on staff thinks you have much chance of succeeding. Only two of our younger people are willing to concede that you have any chance at all."

"Some people are born optimists," I said. I immediately regretted the flip-

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pancy. There was no point in aggravating the situation. A little more softly, I added, "I would be a lot happier myself if we had the means to make the test series a lot more comprehensive."

"Normally, I would agree with a statement like that," Donna said. "But I think that you're building on a fallacious theory to start with. I only wish that the fate of the center wasn't tied to your work. It's bad for morale."

A continuing lack of success was bad for my morale. It didn't do Ike and Jenny much good either, even though we had only minimal expectations for the chemical explosives. Our second run was with two tons of Tri-thermolite-four in each of four sleds. That went off on schedule and produced little more in the way of measurable data than the first test. The third was scheduled to use three tons of TT4 per sled. But before we got a chance to run that set, we ran into a period where none of the hurricanes were suitable. They were either too intense or they were daisy-chained. We spent our time going back over the scant data that our first two runs had given us. But no matter how often we sifted through the data, there wasn't enough information to give us any clues about refining our procedure, or even to suggest whether or not there was any hope of eventual success.

"Is there any way we could use all of our remaining TT4 on one test?" Jenny asked, about ten days into our "dry spell." "Maybe that would give us enough of a bang."

"We're pushing the limits squeezing four tons into a sled for the last TT4 trial," Ike told her—as if she didn't know that already.

"And it might corrupt our data if we tried to juggle eight sleds around an eyewall at one time," I added. "If we could even manage it."

Ike's eyes narrowed, then he shook his head. "We don't have enough control circuits. And I'm not sure I could handle eight sleds at once if we did. Not with the kind of precision we need."

"In any case, it would take two planes to deploy eight sleds, which would mean using center personnel. I'm not sure that would be wise," I said, damping the idea a little further.

"It was an idea," Jenny said with a sigh. "Anything to speed things up."

"I know," I told her. "Look, kids, we both know where the holes are in our experiments. No matter what happens, our work is going to be flawed. If we fail, we might not be able to tell if it's just a matter of insufficient explosive power, or if better positioning of the charges would help. Even if the final run works, our work will still be incomplete. The big questions will be, 'How much overkill is there?' and 'How much less force would have worked?' "

"That's the same question, just worded differently," Ike said.

"I know. That's the point."

By the time we had a suitable target for our third run, we had been on Trident six weeks. The storm was a minimal category five—barely within our test parameters. But the storm showed no sign of weakening. Jenny made this flight with me, leaving Ike on the controls back at the center. Deployment went without a hitch. I started us back

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toward the center while Jenny maneuvered the Mantas into position along the eyewall.

I held my breath from the time I gave the signal for detonation until my monitor confirmed that all four sleds had exploded. A minute later, Ike was on the radio.

"At least I could tell something happened," he reported. Jenny and I exchanged glances that acknowledged another failure before Ike continued. "We're still not showing anything significant though, and the effects are already damped out by the system."

The fourth run, eight days later, didn't produce much in the way of positive results either. Four tons of TT4 in each of the sleds set off minimal ripples, and they lasted for less than a minute before they were lost in the general energy dynamo around the eye of the hurricane.

Doctor Elkins gave me a full day before she asked me to her office for another "conference."

"You're not getting anywhere," she said as soon as I sat down across the desk from her.

"We have one test left to run," I reminded her.

"Give it up, Roy," she said softly. "You're not showing any encouraging results at all. Since it appears that the center here is doomed to close its doors anyway, let's at least not contaminate Trident with nuclear explosions."

"I thought that you were so dedicated to this place that you would do anything to keep it open," I said.

"This place is my life," Donna said. She spoke softly, sorrow more than anger in her voice. "And I *would* do anything to keep it open—anything that offered any hope of success. And your experiments don't."

"I wouldn't be so quick to say that, Donna. It's true that none of our experiments so far have produced any lasting effect, but the last two have produced measurable results. The problem is that we have too few data points to make adequate extrapolations and the interactions are too complex to model with enough precision to make up for it." Even calm weather is difficult to model in detail, and we were dealing with hurricanes and large explosive countercharges.

Donna Elkins didn't show any reaction at all to what I said. She was looking at me, but I'm not even certain that she was actually *seeing* me.

"In a lot of ways, this project is a monumental cock-up," I conceded. "It was designed to meet political requirements more than scientific. It would help if we could do ten times as many experiments, keep working upward on the energy scale in logical steps. Ten times? Even a hundred times might not be too much. But there was only one ship available, and the General Assembly wouldn't have funded more in any case. My instructions are quite clear." *And so are yours.* I didn't have to voice that last part. Donna knew it as well as I did.

"Given enough force, concentrated at the right spots at the right time, we *can* disrupt a storm, even a category five hurricane," I said. One way or another, I qualified mentally. That wasn't a product of our early experiments, just a theoretical certainty that it could be done—although if it took *too* much en-

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ergy, the cure might be worse than the disease. "The only real question is whether the necessary force remains at an acceptable level."

"It's been more than a century since a nuclear bomb was last exploded," Donna said. *Bomb*— I had deliberately avoided the word, and this was the first time she had used it in my presence.

"Bomb," I said. For a moment, I let the word hang between us. "In a way, it may be a good thing to use what once would have been a weapon of war as a tool to save lives."

"That's a terribly transparent attempt at rationalization."

"Maybe," I agreed. "But 27,000 people killed by one storm is a lot harder to accept. Hundreds of thousands of people still living in refugee camps is harder to accept."

"Nothing can bring the dead back. Nothing can erase the damage that Hurricane Lisa did," Donna said. "For more than 200 years we've warned people not to build close to the ocean in hurricane zones. It hasn't done a bit of good."

"And it won't do any good in the *next* 200 years," I added. "Earth can't afford to waste that much land. That's why we have to find another way."

"Even if your fusion bomb does kill a category five here, will they ever let you use it on Earth?"

"After Hurricane Lisa, yes," I said, with more confidence than I really felt.

"So you cure the disease. How many people will the cure kill? We don't have all the literature available here, but I seem to recall some death tolls much higher than 27,000 from nuclear weapons."

"From fission devices used in war, and from accidents in old fission power generating stations nearby," I said. "The only two instances of fusion weapons being used against people were terrorist acts, designed to kill."

"Designed to kill or not. Radioactive fallout keeps killing for decades."

"Not from our devices," I said. "They are as 'clean' as possible, to use the old term for it. They were nanofactured to minimize radioactive fallout. There will be blast effects, high concentrations of neutrons, but very little lasting radiation. And the idea is to hit any storm as far from land as possible, so there should be little human exposure—here or on Earth."

She was silent for several minutes. I didn't get up or say anything. I hardly moved. I could see that Donna Elkins was still extremely unhappy with her situation. She had more to say—once she figured out what that might be.

"Have you picked out the storm yet?" she asked finally, lifting her head to look at me again.

"No. There's nothing suitable just now." I shrugged. "A couple of new tropical depressions forming in the eastern basin may turn out to fit our parameters. It's too soon to tell."

"Some of my people want me to force you to stop," she said after another long pause. "They think you are endangering the native animals. A few of my people think that the Trident chimps are nearly sentient. And I have one man who gets almost hysterical at the very thought of nuclear explosions."

"Kasigi?" It was an easy guess.

She nodded. "The Japanese remain

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extremely sensitive to the issue, even after two centuries. Casey tells me that he had relatives who lived in Nagasaki when it was bombed."

"Do you think he's likely to try anything . . . foolish?" I asked, hesitating before I added the last word. It sounded so banal.

"I don't know," Donna said, meeting my gaze directly. "I don't even know what he might think he could do if he *did* want to do something." A frown passed across her face. "I'm not used to thinking in those terms. Not here. Not with these people."

That's something else she'll blame me for, I thought. "I'll give you as much warning as possible before we use the fusion devices," I said. "But I would appreciate it if you would hold back on that knowledge as long as you can."

She shrugged. "It's difficult to keep secrets here. People will know the minute you start to load your *bombs* anyway. And you've made no secret of your criteria."

The next morning when I left my room to go to the dining hall for breakfast, I found a petition taped to my door. It was signed by every member of the permanent staff except the director. It was all very decorous—no threats, no polemic.

"We the undersigned members of the permanent staff of the Trident Hurricane Study Center request that you terminate your experiments immediately."

Each signature was followed by the signer's degrees. Every one of them had earned at least one doctorate. They were all highly qualified, responsible professionals.

I found it almost impossible to eat that morning. No one stared. They were quite careful not to stare. And no one said anything about the petition or our experiments. But they didn't have to. The petition said enough.

I wanted a perfect specimen for our last trial.

I also wanted to get the fusion experiment run as soon as possible so that the three of us could gather the last of our data and get back up to the ship waiting to take us home to Earth.

The longer the wait, the greater the chance that Casey—or someone else—would try to stop our final run. That gave me a powerful temptation to grab the first hurricane that even approached our established parameters. I started looking very closely at the separation between storms, and at hurricanes that were *almost* category fives, either a little too weak or a little too strong. Jenny and Ike shared my anxiety. Every day all three of us spent too many hours staring at the storm tracking data, as if we hoped to impose a suitable hurricane by force of will.

And we all got a little paranoid after the petition. We started looking over our shoulders whenever we were out among members of the permanent staff. We took our meals together; usually in my room. We checked the seals on the supply bunker and on our payload module a couple of times a day, tested the electronics on our last four Manta air sleds and their cargoes. Long days. Long nights. And the way we acted made the permanent staff more suspicious of us. They had been growing more distant almost from the beginning. Now, the

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separation became virtually complete. Except when it was absolutely necessary, we didn't associate with them and they didn't associate with us. Any communications went through Donna Elkins.

The first two prospective storms were wrong. Either *might* have been suitable, but they moved across the Angry Sea too close together for our purposes. Then the nearer crêche spit out three minor hurricanes—two that never got above category two and one that just barely reached hurricane force.

"I just wish we could get this *over* with," Ike said, eight days after my last long talk with Doctor Elkins. "I'm ready to climb the walls."

The three of us were walking back to the center from the bunker, about an hour before sunset. The sun was out—one more reminder that we hadn't found a suitable storm yet. We had taken to spending as much of each day as possible out in the supply bunker. That kept us away from the staring eyes. It gave us some privacy, some sense of security.

"I can't even sleep any more," Jenny complained. "I keep hearing noises and imagining—well, just about anything."

I knew what she was talking about. Twice I had experienced the same nightmare. In the dream, I woke to find that the local staff had bricked up the doors to our rooms in the night, that we were prisoners doomed to die of suffocation—real "Cask of Amontillado" stuff. I kept that dream to myself.

"Soon," I said—wishful thinking. From my last look at the computer data, it would be at least another three days—and even that would take a few breaks.

Sometimes you get the breaks.

As soon as I was certain that we had the hurricane we needed, I went across the center to Donna Elkins's office. She knew what I had to say as soon as I entered. She had the same view in her holotank that I had in mine.

"This one, right?" she asked, pointing at the storm I had chosen.

"That one," I agreed. I took a deep breath. "Forty-eight hours from right now—if you still insist on that long a delay. We *could* take it on tomorrow though, if you have no one out where there might be a problem. The sooner we get this over with, the better everyone here is going to feel."

She looked at the tank again, then looked down at her desk for a moment before she met my gaze.

"Unfortunately, I agree with you. No one is out at our sub-station." There was a small facility on the coast. "People have been reluctant to wander too far the last several days." There was an accusation behind that, but it was too late to matter.

"Do it tomorrow." She turned away from me. I started to leave, but she said, "Wait."

I waited. After a moment, she got up from her chair and came around the desk.

"You'll be leaving as soon as you gather your data on this?"

"As soon as possible," I said. "We can finish our evaluation process and write our reports on the trip home. I can't see anyone here shedding any tears over our early departure."

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"No." She went back to her chair and sat down. "It's better that you leave quickly. Best that you had never come. Give us what time we have left to close out *our* work before they drag us back to Earth."

"Don't give up yet," I told her—actually feeling a little sympathy for her. "We just might succeed."

She turned away again and I left. I didn't exactly run back toward our quarters, but I wasn't taking a casual stroll either. I was about halfway there when Casey stepped out into the corridor in front of me.

"You found your storm, yes?" he asked—his voice very tight, very tense. Everyone at the center had access to the storm tracking data, and the expertise to interpret it.

"Yes, we found it," I said. "I just left Doctor Elkins's office."

"So you set your bombs off in two days." He didn't make it a question, and I didn't think that it was the time to correct his estimate.

"We're going to run our final experiment," I told him.

"You cannot. You *must* not!"

"We have to, Casey. You know that." I didn't see any hint of a weapon, but I could hardly have been more nervous if he had a gun pointed at my head. The tension that had been building at the center had pushed enough wild fears through my head. Casey was younger than me, probably stronger. I had no idea if he was a student of any of the "martial arts." That had nothing to do with his ancestry. I think half the people on Earth study them for at least a while during their lives. Back in my undergraduate days, I spent some time at it myself. But I hadn't kept up. You don't win bureaucratic fights with judo or karate.

"It is an abomination. You cannot let this horror be reborn." His voice was so tight that it sounded ready to snap. I started looking for a chance to get away from him.

"This time, maybe we can save lives with nuclear power, Casey," I said. "That's what we're trying to do."

He drew himself up ramroad straight, took a deep breath, and held it for a moment.

"You will not cancel your plans?"

"I can't." I tried to balance my weight a little better, but I was carrying more poundage than I had when I frequented the *dojo*. But Kasigi just gave me a formal Japanese bow and walked off.

It wasn't until he turned a corner that I realized how badly he had frightened me. I gave him a few more seconds and then I *did* run the rest of the way back to my room. I only stayed there a couple of minutes though before I went next door to the room Ike and Jenny were sharing.

"Time to load up," I said very softly. "Take anything you can't do without for the next twenty-four hours."

Neither of them asked questions. They were starting to look a little like zombies from lack of sleep—puffy eyes with dark circles, worry lines across their foreheads, clenched teeth. Maybe it was a good thing I couldn't see my own face. It probably looked just as frightful. Or worse. I hadn't told Ike and Jenny about Casey yet. In any case, they didn't need long to get ready—much less than a minute. We headed for the

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nearest exit from the building complex even though that meant detouring around a good part of the center before we could aim directly for the supply bunker.

"What's up?" Ike asked once we had put fifty yards of open ground between us and the nearest building.

"We're going out for our last hurricane tomorrow," I said. I slowed down. I had to if I was going to keep talking. The air only goes so far. Very briefly, I told them about my interview with Doctor Elkins . . . and about my strange confrontation with Kasigi Jo.

"You think he'll try to stop us?" Jenny asked.

"I don't know and I don't want to take chances," I told her. "We'll pull a plane into the bunker, load the sleds, and lock ourselves in until it's time to take off in the morning. Jenny, I want you to stay in the bunker while Ike and I are gone. Locked in. There's at least one computer terminal in there so you'll be able to do your work without any difficulty."

When we reached the bunker, we searched it thoroughly—even though the tracer in the door showed that no one had even attempted to gain entry since the last time Ike and I had opened the door. Ike took a tractor and dragged one of the center's Imre survey planes in for us. And then we locked ourselves in the bunker. As soon as the red light showed over the inside latch, I let out a long breath. We were as secure as we could get on Trident.

"OK, let's take a short break," I said. I plopped myself down on a packing crate and wiped the sweat from my forehead.

"You *are* worried," Jenny observed.

I didn't even try to deny it. "I want a complete check on the plane," I said. "Not just the usual checklist, everything you can think of. I don't *think* there will be any problems. Except for Doctor Elkins, everyone probably thinks we won't go out until the day after tomorrow. But I don't want to take chances." I was getting a little sick of that phrase. "We'll give the sleds the same kind of check." I waited until Ike and Jenny both nodded.

"Then, if there's anything left to the night, we can try to catch some sleep, but I want one of us awake, on guard, all the time. We'll roll out at first light, take off at sunrise. That should put us in position over the eye with a few minutes to spare before it's time to deploy the sleds." The storm we had pinpointed was more than 800 miles east of the center, a couple of time zones, and I wanted to run the detonation as close to noon—local time in the eye—as possible.

It was a long, miserable night even though no one disturbed us. We didn't even have any calls over the complink. But that didn't keep us from being jumpy. It didn't keep us from starting at every real or imagined noise. We checked every circuit on the plane, then visually inspected every part of it we could get at, comparing what we saw with the plans that the computer carried. We ran through checks on the four remaining Manta air sleds and their cargoes. Finally, we loaded the sleds aboard the Imre and inspected them again.

"That's about all we can do until morning," I said when we were finished

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with the sleds. It was well past midnight. In a little more than five hours it would be time to taxi the plane out to the landing strip. "You kids find someplace to get comfortable for a while. I'll take the first watch." I wouldn't be able to sleep anyway. Even when I'm not nervous, sleep takes its own sweet time coming.

Even with the plane sitting in the middle, the bunker was roomy. There was plenty of space for me to pace without bumping into things all the time. We were almost certainly safe in the bunker. The lock would be hard to breach. At the very least, we would have warning. And, as far as I knew, the only explosives on Trident were in that bunker with us. I don't mean just the fusion devices. A few explosive charges were kept around for construction and for seismic probes. It would take a cutting torch and probably more than an hour to get through the door. If a few members of the staff tried to get in, I could call for help and there would be time for help to arrive. Doctor Elkins would have to respond. The ship waiting for us in orbit would monitor any open call I made.

A security camera covered the outside of the bunker door, so no one could hide out there and surprise us when we opened up to run the plane out to the landing strip in the morning.

But I stayed nervous. I could empathize with Casey, and with Donna Elkins and the others. Different cases. Most of the permanent staff of the Trident Hurricane Study Center had put their professional lives fully into the work on Trident. The center literally *was* Elkins's career, twenty years of dedication and work. And she saw it all going down the drain for reasons that had nothing to do with the quality or utility of her work, because of something she had no control over at all—and over an experiment that she saw as impossible.

Maybe it was impossible. I couldn't guarantee that it wasn't. There's still a lot we don't know about nonlinear dynamics, scientific chaos. That's the nature of the beast. We build up a stock of empirical observation, a complex structure of experimentation to go with theories and equations that often appear maddeningly simple before you put them through their iterations. Then, sometimes in very short order, your model can become too complex for even the largest computers to handle reliably in any reasonable amount of time. We can model the fractal programming that allows genes to hold the complex instructions that will result in a human—or an orchid. But we still can't adequately model the old meteorologist's example of a butterfly in China causing a hurricane in the Atlantic. Tomorrow's weather forecast is still wrong occasionally. If our computers could process ten times as much information at ten times the speed our best can now, tomorrow's weather forecast would *still* be wrong once in a while.

I pulled open a crate of meal packets and fixed something to eat. I couldn't even say what it was now—just a meal, food, fuel. Something to do: it gave me ten minutes of sitting down, enough time to rest my feet. But when I got back up and started pacing again, my feet hurt worse than before. I'm not used to that much walking.

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It was after two o'clock when a series of massive yawns convinced me that it was time to try to get a little sleep. I called Ike, and as soon as he responded coherently, I grabbed a couple of blankets and made myself a bed on top of several packing crates. I used one blanket as a pillow and wrapped myself in the other. Apparently, I fell asleep almost at once.

"Roy." A hand touched my shoulder. "Doctor Jepp."

"I'm awake, Jenny," I said, surprised that I had even been asleep.

"About forty-five minutes to sunrise. We'll have a little light before long."

I sat up, stretched, and yawned. I was a long way from alert, but I was awake.

"Ike's fixing breakfast packs for us," Jenny said. That's one thing about holing up in the warehouse. You can count on food.

"Any sign of activity outside?" I asked, collecting my thoughts. I felt drugged, still stuporous from sleep.

"Not a hint," Jenny said. "It's been quiet all night."

All night? There hadn't been much of a night for us. I stood and did some more stretching. I'm not used to going from sleep to working-alertness right away. Back home, I would have a couple of hours to gear up for the office. The morning routine at home and the commute to the IWS office gave me plenty of time to make the transition.

"You checked on our storm lately?" I asked.

"I've been watching. Steady on all points."

"Just hope it stays that way for a few more hours. I'd hate to get out there and have to scrub the run. I don't want to go through more nights like this."

"The winds didn't even weaken during the night," Jenny said. "They may increase today."

I needed a couple of seconds to dredge the last numbers I had seen during the night from my memory. "It shouldn't strengthen enough to get it out of our range," I said.

"Not by noon anyway," Jenny said.

I started walking around, swinging my arms and stretching, trying to pump myself up for the day's work. My back ached. My feet didn't need long to join the party. *I'm really going to feel like hell by the time this is over,* I thought with something less than joyful anticipation. My lifestyle has always been rather sedentary. It was catching up with me in a hurry. *I should get more exercise.* I make that decision periodically. Unfortunately, that's as far as I usually get.

Hurrying through breakfast was the best way to make it palatable. Then it was time to get ready for the day's work.

"Jenny, as soon as we get the plane moved outside, seal the door again. Stay put until we get back, if possible, until we set off the devices at least." She nodded. We were going to trigger them from the Imre this time, rather than from the center—another safety precaution. "You'll be able to monitor everything from here." I pointed at the computer terminal that showed the storm track holo. Jenny nodded again.

I got especially jumpy again when we opened the doors, but there was no one out there waiting for us. Ike ran the tractor to pull the plane outside, then uncoupled the tractor and moved it out of

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the way. Jenny already had the bunker doors shut.

"Let's move!" Ike shouted when he sealed the plane's passenger hatch behind him. I was already in the pilot's seat.

"Well, get up here and let's get through this checklist." I shouted back. I wasn't going to take any stupid chances just to make a fast "getaway," especially without trouble right there on top of us.

We had particularly rough air that morning . . . or maybe it just seemed that way because my nerves were so jangled. As soon as we were airborne, I radioed Doctor Elkins—woke her up—to tell her that we were on our way and to make sure that everyone was inside when we set the devices off. The center was too far away from the eye of the hurricane for there to be any real danger, but the gesture had to be made. Then I radioed Captain Linearson to alert her to the timing of the explosions. Four 17-megaton fusion devices exploding fairly low in the atmosphere could hardly pose a radiation problem for the ship in orbit, but again, it was a gesture that had to be made. I also wanted to get all of the data the ship could collect on the explosions.

"I'm aiming directly for the eye," I told Ike when I finished with the "courtesy" calls. "We'll circle overhead if we have to. I want to make sure we're in place on time."

"I'll go back and run another check on the Mantas," he said. I nodded. Keeping busy was better than sitting idle.

Ike was still working in the cargo hold when Donna Elkins called. We were just under an hour into the flight.

"We've had trouble here," she said.

"What kind of trouble?" I asked, my stomach knotting up. I thought about Jenny back in that bunker and glanced over my shoulder at the hatch leading to the plane's cargo hold.

"Casey. He committed suicide during the night, apparently not long before dawn."

I closed my eyes for an instant and took a deep breath. Relief mixed with sorrow. To be honest, relief was the dominant emotion at the moment. Donna Elkins kept talking.

"He left two notes, one in English on the computer net, the other on paper, handwritten in kanji characters. I've seen Kasigi writing in Japanese. He's not—he wasn't—very speedy. This must have taken him hours to write."

"What did he say?" I asked.

"There's no one else here who reads Japanese, so I can't be sure that the two notes are the same. I'm pretty sure that they aren't. The Japanese note appears to be materially longer—maybe private messages to his family. The note in English says that he killed himself to protest against the use of any nuclear devices for any reason. The note is quite passionate."

I hadn't even thought of the possibility of something like this. I had been so worried that Kasigi might try to physically stop us from carrying out our final experiment that I hadn't thought beyond that.

"I'm sorry, Donna," I said. "I had no idea that he might do something like this."

"Neither did I," she said—with more

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than a little bitterness. "And since I've known him for more than ten years, I should have."

"I'm sorry." I couldn't think of anything else to say. No, I didn't even think of calling off the mission. And even if I *had* thought of it, I wouldn't have.

The next seventy-five minutes were probably the longest of my life, as trite as that may sound. I told Ike what had happened when he came back from inspecting the sleds. Jenny came on the radio long enough to tell me that she had heard the other call and to say that she felt terrible about it. Well, so did I, but there was nothing any of us could do. Not after the fact.

"Jenny, once we get in position, we'll deploy the sleds as soon as possible. I'm not going to bother waiting for the clock." It was only a minor flaw in procedure. The noon blast time had been mostly for convenience. And we wouldn't be early by a lot anyway.

"Still no deviation in the storm data," Jenny said. I knew that. We had the same information on the cockpit terminal.

The squall lines ahead of the main storm were clearly visible from above, the converging arcs like the blades of a child's pinwheel. Up where Ike and I were, the sky was clear, the sun reflecting off the clouds in a dazzling display. For a change I felt no pleasure, no exaltation at the sight of the familiar beautiful patterns of weather systems in the atmosphere. The majestic brush strokes of nature seemed flat and lifeless, faded copies of copies.

Ike and I didn't talk much after I told him about Casey. The flight didn't require much. Nor did the deployment of the air sleds when we got in position. And we didn't feel at all up to idle chatter.

We came in on the eye of the hurricane at 50,000 feet and descended toward the top of the hourglass-shaped eye in a gentle banking turn that left us pointed back toward the center. After a final check of the storm's vital statistics, Ike launched the four air sleds and went to work guiding them into position while I maneuvered the plane up away from the eye and ran the throttles full open to put as much airspace as possible between the eye and us before we triggered the fusion devices.

I would have liked to put a couple of AUs between us. In a pinch, I would have settled for a hundred miles. I hoped to get at least twice that.

"Let me know if any of the sleds start to lose stability," I reminded Ike for about the tenth time in five minutes.

"We're holding good," Ike said, not taking his eyes off the display. "The sleds have enough fuel for another twenty-one minutes."

I nosed the plane forward a little to pick up a few extra miles of airspeed. "We don't want to cut it *too* close," I said.

"The fuel calibration tested perfectly," Ike reminded me.

"Still. Keep a close watch and let me know when the first sled shows five minutes' fuel left." I started doing rough calculations in my head. Our airspeed was just over 550 miles per hour. The storm was moving at 12 mph, but not directly in our direction. That meant that we were pulling away from the eye at a rate of about 9 miles a minute. If

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we could hang on until the first sled got down to 3 minutes' fuel, we would have our 200 mile margin—and just a little more.

I started running through the satellite weather data we had, looking for better winds. And then I smiled for the first time that morning. By dropping another 8,000 feet I could pick up an extra 10 knots of tail wind. I nosed the plane down a little more sharply. That helped too. I was ready to start thinking about *inches* of margin. I did have a rough idea how much power we were going to unleash, and I was thoroughly intimidated.

At least worrying about the sleds and their cargo kept me from dwelling on Kasigi's suicide.

We were 203 miles from the nearest edge of the storm's eye when Ike told me that we had reached five minutes worth of fuel in the first sled.

"Detonate now?" he asked.

I shook my head. "Are all four sleds still stable?"

"Perfectly," he assured me. "They're keeping station like they were tied together."

"We'll hold off as long as possible," I said. "Just keep a close watch on them. Jenny, you listening?"

"I'm listening," she said. "Crank up the filters on your windows."

"Right. Thanks for the reminder," I said. I hit the manual control and the sky darkened noticeably. We were far enough away that the fireball wouldn't even be visible—if the historical data was correct. We shouldn't be able to see anything of the explosion. But again, we were taking absolutely no chances. "All the way to the stops," I reported.

"Four minutes on fuel," Ike said softly.

I glanced at my navigation screen. We were 213 miles from the nearest *bomb*. Even the most bizarre set of circumstances we could imagine wouldn't produce anything that might remotely endanger the Imre at that distance—shock wave or radiation. That didn't stop my nerves from jumping. It *had* been a hundred years since a fusion device had been detonated.

"As long as everything holds stable, hit the button at two minutes." I said. "If anything even starts to look as if it might be ready to go wacky, warn me and hit the button at once."

Two minutes. I must have aged ten years in the last seconds of waiting. Ike detonated the explosives. We saw nothing, felt nothing. Only the reports from the satellites told us that all four devices had exploded. We waited for a short eternity, staring at the constantly updated model of the storm in our holotank.

Things happened.

The eyewall pulsed out and down. The water-laden clouds boiled away, vaporized. The force of the explosions kicked against the 170 mph winds around the eye of the hurricane, pushing some forward, throwing a wall in front of others, disrupting the patterns through the middle altitudes of the storm. The heat and downward pressure of the explosion increased atmospheric pressure below.

Our computer model couldn't show everything that was happening, couldn't keep up with the pace. Conditions in and around the eye changed too quickly for the satellite monitors to keep pace.

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The hurricane rebounded inward.
And the system ripped itself apart.

It didn't happen instantly. After all, the hurricane was more than 600 miles in diameter. But there was enough action along the eyewall in the first two minutes to tell us that we were doing something. We had tipped a strong, well-organized hurricane into chaotic instability. After five minutes, the disruption was still increasing. Ten minutes after detonation, there was no doubt in my mind. The hurricane wasn't dead, but it was dying.

"We did it! We did it!" Ike was shouting almost right into my ear. Jenny was yelling the same thing over the radio. Maybe I did a little shouting myself.

But the shouting didn't last long. Against the darkened glass of the windshield in front of me, I could almost see Kasigi's face, begging me not to do it. "*You cannot let this horror be reborn.*"

And now it was a squalling infant.

We left two days later. There was no trace remaining of the storm we had killed. But the ghost of a man remained, a man who had died to protest what we had done. Kasigi Jo had already been buried, on Trident, at his own request. I was carrying his suicide notes, his *manifestoes,* back to Earth. I would make his notes public, regardless of the *fallout* there. I owed him that much. Others could decide whether or not we should use our new weapon against the ravages of nature. I had little doubt what the final decision would be.

"I assume that the work will continue," I told Donna Elkins at our last meeting. "We know that the theory is workable now. It needs to be refined. If nothing else, we need to find the minimum force needed."

"Does that mean you'll be coming back?"

I shook my head first, then shrugged. "I don't know. I think that the work has to continue, but I'm having trouble working up any enthusiasm for doing it myself."

"I know the feeling," she said. Then she sighed. "You're right, the work will go on. But I've lost my enthusiasm too. When the next load of bombs comes out, I go home. Quit. I don't want any part of it." She turned away from me. "I love this place and I'll miss it more than anything, but I can't fight for it here. I've got to go back to Earth to do that."

"Maybe I'll see you there," I said. And then I left. Quickly. ■

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Jay Kay Klein's biolog

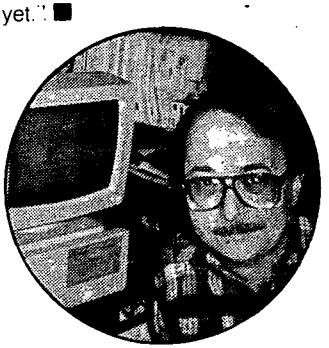
If you're a historian like Richard M. Shelley, with a BA from the University of Illinois and an MA from the University of Missouri at St. Louis, you can see man's footsteps marching from the follies of the past on into the follies of the future. He was born and raised in Kankakee, IL, notable otherwise for being mentioned in Groucho Marx's song "Lydia, the Tattooed Lady."

He now lives outside Maryville, TN, having followed family members to a state where many of its population are still carrying on a government-backed campaign to enforce the teaching of Creationism. Rick notes the state university has in recent years spent over $30 million for a basketball arena and $9 million to provide the football team with a half-field indoor practice field, the fanciest locker room in the conference, and sky boxes over the stadium. Meanwhile, some of the science labs have to use equipment that was obsolete 30 years ago. All this has a bearing on Rick's view of how the past points towards the future.

Technology's rapid, accelerating advances are running into sociology's resurgent religious "fundamentalism," which, Rick notes, leaves the likely futures to resolve into patterns of "chaos," to use the parlance of a very new science. The fractalization of future histories has led Rick to sidestep the process of straight-line extrapolation, and utilize a method first appearing in this magazine's one-time sister publication *Unknown Worlds*, a synthesis of science, fantasy, and history. His first book, due for publication this year by New American Library, has a "real world" hero stuck in a fantasy world where Big Bang cosmogony and recombinant DNA are part of the major problems.

Two of Rick's writing models are Roger Zelazny, a writer of legendary stylistic polish, and Robert Heinlein, legendary for solidifying realistic futures by sleight of hand with a typewriter. The future has just caught up with Rick in the form of a switch from typewriter to word processor, just as an assortment of odd jobs in the past has given way to full-time writing. He had been writing since grade school, but only recently has been able to get people to pay him for it. His first story in *Analog*, January, 1985, was a novelette about a survey ship coming across a colony planet where the people had devolved back into apes but retained enough human characteristics to want to burn their discoverers at the stake as heretics, and forcibly convert Earth to their own fundamentalist religion.

For ourselves, Rick sees reading and world literature devolving back to the era he specialized in, medieval Europe. For entertainment then, illiterates watched simple-minded plays. Even many of the books today are "written television," aimed at the lowest common mentality. Still, the 586 chip is already talked about before hardly anyone has had his hands on a 486-driven computer, and there's still no software dedicated to the "obsolete" 386 chip, while the 286 chip is barely outselling the 086 chip. Rick says, "One of the most exciting things to do is simply watch the future arrive." His prediction for the future: "You ain't seen nothing yet." ■



Rick Shelley

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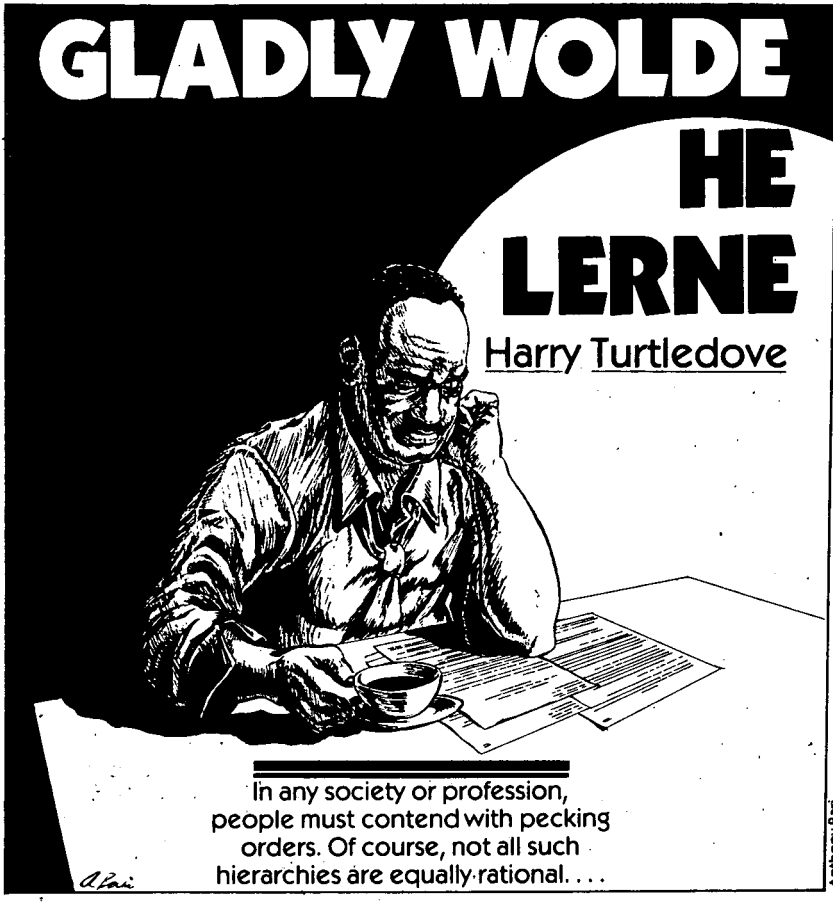
GLADLY WOLDE HE LERNE

Harry Turtledove



In any society or profession, people must contend with pecking orders. Of course, not all such hierarchies are equally rational. . . .

Anthony Bari

Only the cold, green-blue glow of mercury vapor lamps lit the campus lot when Ted Collins pulled in. He had to park a long way from the lecture hall. He hauled his attaché case off the front passenger seat and locked the car. Then, already weary from a full day's work, he trudged over the asphalt toward the hall.

It was more than half full when he came in. Even so, it was quiet; the rest of the educators there were as worn as he was. Some of the superintendents, administrators, program specialists, and supervisors looked fresh out of college. Others, like him, were a few years older, already experienced in managing school district affairs.

Whatever their backgrounds—Collins himself was an assistant superintendent for education planning and research—they all had one thing in common. They were all ambitious enough to go to night school to learn what they needed to

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know to advance in the educational bureaucracy.

Professor Vance walked in. She strode briskly to the podium, and tapped at the microphone to make sure it worked. Collins took out his notebook and a pen. He'd heard from people who had been through this course that Vance didn't believe in wasting time.

She didn't. As soon as she found the mike was live, she plunged straight into her lecture: "Anyone can be a success at the district level. Policies are blurred there, responsibilities vague; very often you never see the actual clients who depend on you for educational services. If you hope to go further in education, you'll have to lose that pervasive vagueness. You got by with it at the university, you can get by with it at district offices, but it's a fatal handicap in an actual school setting. Here's what I mean. . . ."

By the time that first lecture was done, Collins wondered what had possessed him to want to become a principal in the first place. He thought about dropping the class and staying comfortably in his present job. He shook his head. When he started something, he wasn't the sort to back away from it.

He ended up acing Vance's course. He took the others he needed, one or two a semester, always at night, as he could fit them into the rest of his life. He went through an internship program at an actual junior high school campus. He took the state-required examination for certification. Before long, he got an interview. The committee let him hang for two weeks before they let him know he'd been accepted. Kranz Elementary School had itself a new principal.

When Collins got the news, he threw the biggest party he'd ever given—and ended up with the biggest hangover he'd ever had. The hangover eventually went away. As for the size of the party—well, what the hell? With the raise he'd get from his promotion, he could afford it and then some.

He started his new job in the fall. It was as challenging as he'd hoped it would be. Budgeting for a single school was much more complicated—and, as Professor Vance had warned so long ago, a much more precise business than planning for districtwide programs, where you could always shuffle money between dozens of different accounts.

Human relations counted for more at the school-site level, too. Little by little, he learned how to build a rapport with the faculty. As principal, he also came into contact with pupils, something he'd never done back in the district office. Dealing with them made the problem of handling a staff look simple. But again, he learned.

He got on with the rest of his life, too. He married a curriculum specialist from the district office where he'd worked before. He took up golf. After a while, he was shooting in the mid-eighties. He grew a mustache. After a while, it turned to salt-and-pepper.

Satisfying as his principal's assignment had been, he slowly decided it didn't give him everything he needed. He hated the idea of being in a rut for the rest of his life. He talked things over with his wife. "Go for it," she said. "I know it'll be tough. Even if you don't make it—and so many people don't—you'll be better for the experience. But I think you will. I think you can do it."

"You're wonderful," he said, and

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kissed her. The very next day, he enrolled in night school again.

The moment he walked into his first class, he saw most of his fellow students were folks a lot like him: solid men and women who'd already built up solid careers but wanted something more. Oh, there were a couple of people in their early thirties, but only a couple. He knew they were the ones he'd have to watch out for, the whiz kids, the ones on the fast track to the top. He was no whiz kid. He was a grinder. That had always worked till now. He had to hope it would keep on working.

"Congratulations," Dr. de la Vega said as he walked to the front of the classroom and sat down on the table by the podium. "Congratulations just for being here, and for wanting to be the best." His mild smile turned savage. "Now we'll see how many of you I can run out of the program over the next twenty weeks."

He meant it, too. Nothing was watered down here, nothing simplified to let the slower people keep up. If you couldn't keep up, too bad. Grimly, Collins buckled down to do the work. He ended up with a high "B" in the course, and felt prouder of it than of most "A"s he'd earned.

Every course in the whole program turned out to be like that. Collins learned to live on coffee and four hours of sleep a night. At a physical, his doctor warned him all that coffee could bring on an ulcer. He kept drinking it. Without it, he would have had to quit, and he'd come too far to do that.

As time went on, he became ever more conscious of the responsibility that came with jobs at the top of the hierarchy. He had to look hard at himself to find out whether he truly wanted it. Without false modesty, he decided he did.

Before he was even allowed to take the exams at the end of the program, he had to convince an interview board he was worthy. The exams themselves made the ones he'd taken to qualify for principal look like a pop quiz. When he learned he'd passed, everybody at his school gave him a party. He got his picture in the local paper, along with half a dozen other tired-looking people.

More interviews—now he could pick and choose, because there were always more jobs than people qualified to fill them. He finally settled on one not far from where he lived, in a top-notch school. "We're delighted to have you," the principal there said, shaking his hand.

Once his exams were over, Collins had cut way back on his caffeine intake. Even so, he hardly slept the night before his first day on the new job. "Am I really good enough?" he asked his wife as he picked at breakfast that morning.

"You bet you are," she said. "Now go get 'em."

For all her encouragement, he needed a deep breath to still the fear inside him as he walked up to the enameled door with the tarnished brass 7 on it. He opened the door. He went inside.

"Good morning, class," he said, forcing his voice to steadiness.

"Good morning, teacher," the children chorused.

Teacher. He felt ready to burst with pride. After so long, after so much hard work, at last he'd reached the pinnacle of his profession. ■

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The Alternative View

TRAVEL AND TOURISM

G. Harry Stine

In the last decade of the twentieth century, it seems we are witnessing a series of "revolutions" that have uprooted the life styles of people on this planet. The nightly TV news continues to report what appear to be drastic changes around the world. "Empires" are falling. "Ideologies" that were once believed to be the wave of the future are suddenly seen to be only another version of the Attila Syndrome—take it instead of make it. Part of this may be due to the sort of realization that it's time to make a change, something I discussed in a previous column entitled *Centennials, Fin de Siecles, and the Millennium* (February 1990 issue).

My long-time friend, Arthur C. Clarke—I met Arthur in 1952 and smuggled him into White Sands to see a rocket shoot—has carefully detailed the sort of revolution which has occurred as a result of instant worldwide communications. Those people who are able to take advantage of this have been able to move ahead faster, organize better, and control vast new resources based on information.

The recent death of Robert Noyce, co-inventor of the integrated circuit, caused us to stop and reflect what this tiny invention had done for us in only the past quarter of a century. It made it possible for Joe Lunchpail and Jane Microwave to access and control enormous quantities of information, and it freed those who were willing and able to embrace the technology.

The IC probably prevented another general war, too. As pointed out by Lieutenant General Daniel O. Graham, *the giant stumbled over the microchip.* The Soviet Union lost the technological conflict of World War II. (In a recent telephone conversation, Martin Caidin observed that WWII really came to an end in 1989.)

However, I believe we're being restrictive and limited in our vision if we attempt to attribute only to better communications the enormous changes now going on all around us in the world. Arthur Clarke and I don't agree on everything. (That's a good thing because it's impossible to make progress without controversy.) Arthur may say that everyone is going to sit around in front of their terminal screens manipulating data, but I maintain that someone is still going to have to milk the cows (or hook up and fix the cow-milking robots).

People don't just like to talk to one another. They like to get together. A human being is a social organism.

The average person's increasing accessibility to high-speed low-cost travel has also had a great deal to do with what's happening in the world today. Even after we get such things as worldwide holographic teleconferencing where

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it will appear that someone half a world away is actually sitting across the table from you, no communication system yet devised or even existing as a bright idea in the mind of some inventor has the capability to communicate the unknown and intangible transmissions that occur between people in a face-to-face meeting. Businessmen know this. Politicians know this. Diplomats know this. World and national leaders know this. And they will use and pay for Mach 25 aerospace transportation when it becomes available. Robert A. Heinlein wrote in *The Man Who Sold The Moon* (Shasta Publishers, 1950), "Fast transportation will pay; it always has." It is as true today as when he wrote it.

But, as pointed out above, travel today is different than travel has been in the past. It is widely available at a cost within the personal resources of a large and growing number of the world's population. And an important new angle has surfaced practically unnoticed in the past 150 years.

Pulitzer Prize-winning author Daniel J. Boorstin points out in his essay, *From Traveler to Tourist*, that before the nineteenth century travel was a laborious, troublesome, and dangerous activity. People traveled then only because they *had to*. Travel was carried out only with the goal of high expectations in the form of profit. A traveler expected life-threatening danger, high adventure, and unanticipated experiences.

But that began to change in the nineteenth century with the development of the railroad. Travel could become a packaged commodity. This ability to package travel created the *tourist*.

A tourist is a person who passively expects to encounter no danger, to survive the travel experience, to have adventure happen as planned, and to let the little details be handled by the travel agent. A tourist goes "sightseeing," a word coined in 1847.

Jules Verne's Phileas Fogg went around the world in 80 days, precisely at the time when travelers were becoming tourists. Verne's novel was an excellent marketing tool for entrepreneurs who had seen what was happening and figured out how to make money providing a new service. Thomas Cook and American Express got their start by packaging travel. They combined the convenience and safety of the new railways and steam ships. They used telegraphic communications to make reservations. They issued coupons for hotel stays in foreign lands. And they invented and sold traveler's checks that were convertible everywhere into the local currency.

Passenger air transportation was initially, and still is, an industry with an intermix of business travelers trying to get there before their competitors, and tourists who are going sightseeing on a totally planned non-adventure. About the worst thing that can happen is to have the baggage go to Rio when you've gone to Paris. Or to miss the connection at O'Hare.

Ocean-going ship travel was originally the dangerous "travail" from which the word "travel" itself derives. It became the preferred mode of world transportation with the advent of the steamship. But it nearly sank into oblivion until a television series, "The Love Boat," came along. That series rejuvenated the cruise ship market. It

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showed and promised sex and adventure that wasn't and isn't really there. Never mind; modern telecommunications used for entertainment (and making money) rescued the cruise ship and saved an industry. Some people made money and other people had fun. It's a perfect example of how people behave in Herman Kahn's "post-industrial society" where things are done for their own sake because people are far richer than their grandparents, and because someone has figured out how to make a buck providing a product or service. Tourism is a primary industry of Kahn's post-industrial world *in which we now live.*

Think not? The travel and tourism industry is huge.

Let's take a look at only one small aspect of it.

According to data from the Cruise Lines International Association of New York City, 3,285,000 Americans took an ocean-going cruise in 1989. They spent $4 billion for their ocean-going travel alone. This means that the average cruise cost $1217.66 per person. With a multiplier factor of 5 brought in to determine total costs per person for a cruise—travel to and from the debarkation point, clothing, souvenirs, money spent ashore, money spent aboard ship—this brings the average cost per person of a modern ocean-going cruise to $7,305.96.

A cruise from the American east coast to the west coast through the Panama Canal costs $8,400 per person.

A 10-day European cruise around the Mediterranean with a penthouse suite on a cruise ship costs $11,000 per person.

But the cost of going around the world on the Cunard liner H.M.S. *Queen Elizabeth II* runs more than $15,000, depending upon desired accommodations. Several thousand people per year make equivalent trips on the *QE2* and other liners.

So you put off buying the new car until next year.

But most of us depend upon air transportation, something that did not exist when the twentieth century began. By 1938, American domestic airlines alone finally carried a million passengers per year. In 1988, this had risen to 454,600,000 passengers per year. My own home-town's air carrier airport, Phoenix Sky Harbor International, had more than 16 million passengers come and go through its jetway gates in 1988. People are traveling by air for business and pleasure at a rate that's increasing by nearly 4% per year. We're not running out of space in the sky; the ancient air traffic control system designed to handle the propeller-driven DC-4s and Constellations of 40 years ago slows things down but isn't a show-stopper. The application of modern technology can alleviate those problems. The real limitation right now is physical and requires concrete and steel: the lack of runways and gates at peak operating periods.

(Rail travel? Amtrak operates only 220 intercity trains and carried about 21 million passengers nationwide in 1988. Most of this traffic is tourism-related because rail travel is almost too slow for long-distance intercity business purposes. The Metroliner between Washington and Boston is a viable alternative to the various air shuttle services, but when was the last time you took the

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train between New York City and Chicago for a business meeting?)

If you've got the time but not the money and want to take the family along with you, drive the car.

But you can't drive across the Atlantic or Pacific Oceans. We have yet to build Harry Harrison's transatlantic tunnel.

The ability of jet airliners to carry more people daily across the oceans than the fabled ocean ships of the past has resulted in a sort of face-to-face communication between people that the electronic comm media can't seem to duplicate. It has led to an even further exchange of ideas and information and understanding. One is *somewhat* less likely to want to go to war when doing so might mean killing someone you've met and gotten to like a little bit. And tourism puts a whole new meaning on what is seen on the TV news when people riot in the streets because they now know other people elsewhere have a way of life where they don't have to riot in the streets to get Attila off their backs. It's also a matter of gut-wrenching reality: "My God, I've *been* there! And it was such a pretty park in such a lovely city!"

I'm on an international on-line computer network known as BIX (Byte Information Exchange). I've communicated by computer with people from Australia to Yugoslavia, from Brazil to South Africa. But when we discover that someone on the computer network is going to come to town on business or pleasure, we inevitably schedule a party for them. Meeting them and getting to know them a little bit is important. We're human beings. We interact best on a one-on-one basis.

And this is why travel and tourism are as important to a stable future as electronic communications. ■

● "Leverage" is commonly used these days in a financial sense to mean risk/reward amplification through the assumption of debt. But there are many kinds of leverage. Technological leverage, the power born of knowledge, is supreme among all forms. We used it to build Autodesk into the company it is today, fending off competitors with far more money and people by simply knowing where technology had to go and hitching a ride.

John Walker

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CANSO DE FIS DE JOVENT

John Barnes

Most people grow up inside a single culture which they (quite naturally) mistake for The Whole World. Until they get a good look at another. . . .

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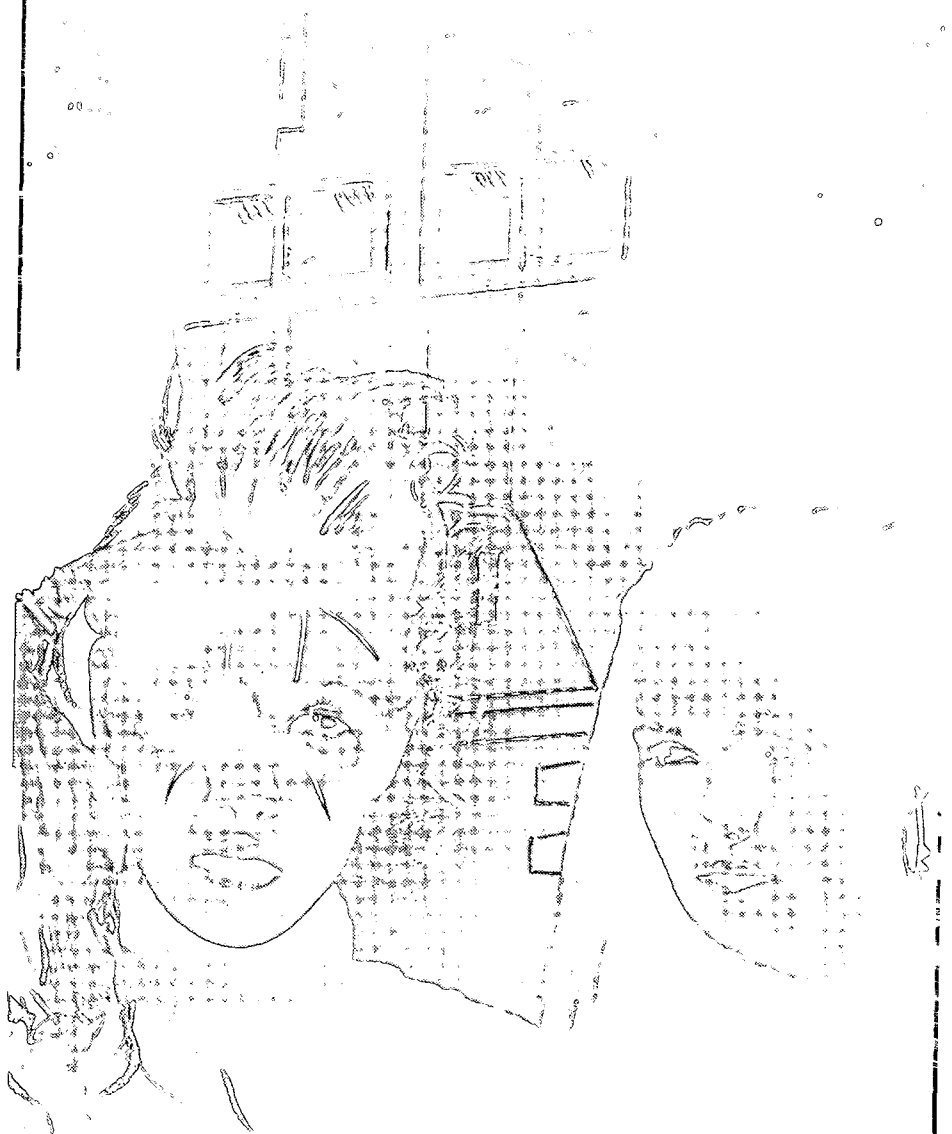

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We were in Pertz's Tavern, up in the hills above Noupeitau, with the usual people, ostensibly planning a vacation trip backpacking in Terraust and actually drinking on Aimeric's tab. It was still several weeks till the fires were due, and we thought we might see the first herds of auroc-de-mer migrating to the banks of the Great Polar River, beginning their 1,700 kilometer swim to the sea. Aimeric had never seen it and was wild to go; the rest of us just liked watching him get all excited about it, especially when the red wine was flowing freely from his account.

"Perhaps on the last day we can spring to Bo Merce Bay and see the first ones head out to sea. They say that's *really* a sight." Aimeric laughed, looking down into his wine, and I saw that the bald spot we all mocked behind his back was bigger than ever. It made me feel a little sad somehow.

"Maybe we should hang around to make sure we see it?" he asked, looking at me because I had done more of this sort of thing than anyone else in the crowd. "Last chance for twelve stan-years, we shouldn't miss it, *m'es vis, companho.*" He slid his arm around Bieris, his *entendedora* of the time, and pulled her closer to him; she raised an eyebrow at me, asking me not to encourage him.

Garsenda, who was my *entendedora*, squeezed my arm and whispered in my ear, "I think he really means to go. Are you going to?"

"Certainly, *midons,* if you wish. My father took me when I was about nine. It really is very impressive and I wouldn't mind seeing it again."

"Giraut's seen it," Garsenda said, very loudly. "Giraut can tell you all about it."

Everyone stopped talking and looked at us. If Garsenda had not had long thick blue-black hair, bright blue eyes, and an astonishing breast-to-waist ratio, she'd never have been my *entendedora*; I surely wouldn't have chosen her based on her personality. There were times when I thought of getting rid of her, but frankly she so impressed my *companho* that it was worth tolerating her many little lapses. I only wished that the laws of *finamor* did not demand that I think of her as perfect.

She giggled when she realized they were staring, and rubbed my thigh in a long stroke under the table. "I thought we were talking about going backpacking to the South Pole," she said. "You know, to see the aurocs-de-mer turn their legs to flippers or whatever it is they do."

"Yes, we were," Raimbaut said. He never talked much, but his grin told me he was enjoying watching my *entendedora* embarrass me. I grinned back, since he had none of his own; if he wanted to get insulting, I held trump.

"Have you actually seen it?" Aimeric asked.

Bieris hit him on the shoulder, giving him her don't-encourage-Garsenda glare.

"Ja, my father took me the year before you got here, Aimeric." I took the carafe and helped myself to another glass of wine; Aimeric flagged old Pertz, behind the bar, who started to pour another. I realized I had lost count of the glasses, and didn't care. "And what actually happens is that they have

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these pockets that their legs or flippers, whichever they want, fold into. They just disjoint whatever they're not using and tuck it into the pocket is all. The guy who designed them must have been a real genius—not just having the organs, but having the instinct to do that, is really something." I sipped the wine again, and noticed I had everyone's attention—maybe everyone did want to go. "But I'd suggest we just go and see them get into the river. The going out to sea doesn't look like much—just a lot of big gray-brown backs in the water. Not nearly as impressive as the levithi you can see from Bisbat Head, not by a long shot."

Aimeric said, "Giraut, you could make a dance on the clouds, wearing gossamer wings sound like going down the hall to spring your laundry to the cleaners." Raimbaut and Marcabru both laughed a lot more than it was worth, which told me they were as drunk as I was.

Marcabru, who rarely went out of the city if he could help it, said "Maybe we'd like to see the whole thing, both the migration into the river and the swim out to sea. As Aimeric says, not for another twelve stanyears. . . ."

Raimbaut nodded vigorously and refilled his glass.

Aimeric beamed at them. "Consensus is against you, Olde Woodes Hande." That was the nickname he had given me when I was twelve and he was new to the planet, on the many family trips my father had taken him on. "I think we should stay the extra days."

I shrugged. "Fine, but you should know that it's slightly more dangerous. While we're hiking around, let me show you some of the graveyards. The aurocde-mer only *usually* beat the fires to the river. Every year some of them— sometimes a lot of them—get roasted. They get piled up in box canyons or at the foot of bluffs. Then after the snowfields form and melt, the charred aurocs-demer get swept into streams and end up piled along parts of the river, sometimes in meters-thick banks of white bone and black carbon. It's very vivid, and you shouldn't miss the sight—but I don't want any of us to become a permanent part of it."

Marcabru smiled at me. "Very prudent of you, Giraut. You're getting old. Hey, Garsenda, want a fresh young *entendedos* when Grandpa Giraut gets tired?"

It was nothing of course—mere banter between old friends—but then a big brawny kid, sixteen or seventeen and far-gone drunk from the look of him, bellowed from the next table, "You're a coward."

Every table in Pertz's went instantly quiet.

Ragging among friends is one thing but in Nou Occitan honor is everything. I slid sideways away from Garsenda. "This won't take long, *midons*."

"You're a coward, Redsleeves," the young lout repeated. From his voice, I guessed he had stood up; I glanced at Marcabru to make sure the goon wasn't standing over me waiting to rabbit-punch me when I stood, a low dirty trick that was very popular among the Interstellars, as anything low and dirty tended to be. And though I hadn't paid much attention, I knew that the kids at the table behind me were all dressed as Interstellars.

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Marcabru nodded a go at me, and I kicked the bench backward hard and spun to face them. There was a loud bang beside me as Marc's epee uncoiled into rigidity, its neuroducer tip almost in the face of that young clown. Between the flickering glow of the neuroducer in his face, and the slam of the bench against his shins, the kid took a big leap back, giving us a little room to take stock.

It didn't look good. There were five young Interstellars, all dressed in the navy-and-black style patterned from Earth bureaucratic uniforms, against four of us. All of them were big and muscular, and they had the kind of stupid sneering pride in their faces that almost screams "I want to fight." Probably they were all dosed on a berserker drug and would be impossible to beat without serious injury to our side.

The smart thing, if possible, would be to avoid a fight.

On the other hand I detested Interstellars anyway. Their idea of art was sadoporn, their idea of music was raw noise, and their idea of courtesy was nonexistent.

And spirit and style were everything—anyone could be graceful with nothing at stake—so *enseingnamen* demanded that I proceed.

Everyone speaks Terstad everywhere you go in the Thousand Cultures, but it doesn't offer the powerful, compressed imagery of Occitan, so it was that in which I insulted him; a few musical, rolling syllables sufficed to point out that his father had dribbled the best part of him onto the bathroom floor, his mother was in sexual thrall to a seaskunk, and he needed to wash his face of the stench of his cheap-whore sister.

It was a fine calling-out for spur of the moment and half-drunk, and I got a warm glow just from delivering it. Aimeric and Raimbaut rose to their feet, applauding with harsh, ugly laughs to make it clear that it was everyone's fight.

The young vulgarian glared at me. "Talk Terstad. I don't understand school talk."

He was not telling the truth, since all instruction is in Occitan after the fourth year, but it was a point of pride with Interstellars to speak only Terstad, because they were determined to reject everything about their own culture and tradition.

"I should have expected that," I said. "You *look* stupid. All right, I'll translate—please let me know if I'm going too fast. Your father (that's one of those drunks your mother called 'customers') dribbled the best part of you—"

"I don't give a shit what the Octalk meant. I just want to fight you."

His epee banged out into a straight line and pointed at me. Mine replied. There was a fast flurry of pops as everyone else extended epees, and crashing and scrambling sounds as everyone else in Pertz's tried to get out of the way.

He grinned at me and glanced at Garsenda. "After we get done with all of you, me and my friends will share your slut."

It was a dumb adolescent trick, which probably worked pretty well on dumb adolescents. I drew a sharp breath and dropped my point a hairsbreadth, as if he had actually broken my focus. He lunged—straight onto the point of my

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epee, which tapped his exposed larynx, bending like a fly rod under the force of the collision.

He fell to the floor, bubbling and grasping his throat. The neuroducer had had a good solid contact, and it would require sedation and several days slow revival to convince him that he did not have blood gushing from a hole in his throat. After a little more bubbling, as we all stood watching him, he hallucinated himself dead and went into a coma.

I sort of hoped I had actually bruised him with the force of the blow, but they'd be able to fix that, too. On the other hand, a really good zap with a neuroducer is almost impossible to erase with anything but time, so chances were his throat would still hurt a decade from now, and probably spasm hard enough to choke him every now and then. The situation was satisfactory as far as I was concerned.

Marcabru apparently had the same thought. "An apology, on behalf of your friend, would settle this," he said.

"I wish we could," the biggest of them said, "but then we'd all have to fight him as soon as he got out of the hospital—with fists, too. Gwim is strict with us."

Two more things I hated about Interstellars—they liked to give and take orders from each other, and they contracted fine old Occitan names like Guilhem down to ugly grunts like Gwim. "Then let's get on with it," I said. "The odds are honorable now."

The two in the back gulped hard, but to give them credit, they all nodded. Maybe there was a little *enseingnamen* left in them despite the clothes.

"Let's do this in the street," I added. "Pertz doesn't need any more furniture broken up, and a stray hit with a neuroducer can wipe a vu."

I glanced at the Wall of Honor, memorializing Pertz's dead patrons, and all the vus were smiling and nodding, as if they'd heard me. It was an eerie effect, but in a moment they were all out of unison again.

When I looked back, the Intersellars were nodding, and so were my seconds. Aimeric had that lazy bored look he got when he was ready for really intense pleasure. Marcabru was solidly ready and balanced, his face almost blank. Raimbaut had that crazy gleam in his eye and was rocking back and forth on his feet, almost bouncing—I never knew anyone who loved a brawl or a wild adventure better. He told me later that he wasn't unhappy about how he died, only about when.

Maybe I should have seen it coming—his face was distorted in a dozen places where the muscles could not be convinced they weren't scarred, and his left shoulder and right ankle were stiff for the same reason. That suggested that there must be internal effects as well, and if I had been thinking I might not have let things go the way they did.

But of course he and I were both twenty-two stanyears old. You think you're immortal then.

With a quick, fierce nod, he signaled for me to get on with it. I said, "Well, then, gentlemen, the street. Will it be to first yield, to first death, or without limit?"

"First death?" one of the ones behind squeaked, and the brawny blonde boy

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who now seemed to be their leader nodded.

"I think we'll have to, to satisfy Gwim."

"All right then, to the street, *atz dos*," I said.

We walked out side by side in pairs, one of them with each of us—it's the position for honorable people, and given that they were Interstellars it might have been some risk, but they had shown real *enseingnamen* since their vulgarian leader's dispatch, and so I extended them the courtesy.

The street was empty—everyone was down at Festival Night in Noupeitau. From far below, we could hear the clash of a dozen brass bands playing in different parts of the city, mixed together by distance.

The red-brick villas up here were the color of heartsblood in the warm red glow of the sunset; the little red dot of Arcturus, a bloody period, was sinking into Totzmare in the west, and the surf was running fast and big. The skimmers riding them in (on the western coast of Nou Occitan, waves are ridable as much as 200 kilometer out to sea) were just putting on running lights, and a few were tacking and putting on sail to work their way back out to sea so that they could start another run next morning. On Wilson during those last few weeks before a Dark, when the sky was still deep purple rather than muddy and the long evenings were still warm, always seemed to hurry by too fast.

It was a good night to be alive, and a fine setting for a brawl.

"Let's get on with it." It was my responsibility to say that, for though I had challenged originally, the boys' taking up their friend's quarrel had made me the challenged, so timing and protocol were mine to decide. I might have chosen the issue fought to as well, but, under an imputation of cowardice, I preferred to defy them by letting them choose. When I saw how young and scared their faces looked in the sharp black-edged shadows of the red street, I thought of softening it to first yield—and then rejected it. Let them bear the consequences.

I spoke the traditional words then: *"Atz fis prim. Non que malvolensa, que per ilh tensa sola."* It meant "to the first death"—that to remind everyone when we were to stop—and "not from rancor, but merely for the sake of the quarrel"—to remind us that this fight was supposed to settle whatever question there was for good and forever.

Then I flicked my epee upward in salute, the boy facing me did the same, and all the seconds saluted in unison. Their epees had barely returned to ready when the boy was on me.

Our epees had clashed no more than ten times—I had not yet formed any impression of him—when Aimeric cried *"Patz marves!"* to end the fight.

All the safety locks clicked, and the epees coiled back into their hilts, the guards folding in last. I dropped mine unconsciously into my pocket, looking to see who had died.

Raimbaut was on the ground, not moving. At first it was nothing we hadn't seen before—we were getting ready to move him to the back room at Pertz's with the young clown who had started all the trouble, for pickup the next morning.

And it even made sense that it was

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Raimbaut; much as he loved a fight, he was slow and easily fooled. I had seen him dead three times before, and there had been other times as well, when I hadn't been there.

Then we heard the wail of the siren. Everyone gasped, knowing what it meant—Raimbaut's transponder had signaled an emergency. We set him down in the street and backed away; we had time to get no more than a dozen paces away before an ambulance dove in from directly overhead, lowered the springer box over him, and sprang him to the emergency room. Then it lifted slowly and flew away, leaving a rectangular depression, the shape of the box and a half centimeter deep, in the pavement.

By the time we got inside and commed the hospital's infocess, they knew. At the bottom of the report, beneath all the terse notes from the aintellect about liver and kidney damage, and hysterical distortion of the heart, someone human had noted "one shock too many."

The burial took forever. His parents didn't show for it, and that was the best thing that happened.

Raimbaut babbled all the way through his funeral, too. His will named me as recipient, so I had struggled through carrying his body up the mountain, along with Marcabru, Aimeric, David, Johanne, and Rufeu, with the added difficulty of pain from the fresh scar where his psypyx had been implanted in the back of my neck.

Raimbaut watched through my eyes as we lowered his naked body onto its bed of roses, at the bottom of the grave we had melted into the raw granite of Montanha Valor.

Each *donzelha* present climbed down and kissed his corpse, rubbing her face on his to anoint him with her tears. There were a lot of them—which surprised Raimbaut so much that he couldn't stop talking about it in my head.

Garsenda made a truly spectacular show of her grief, though she'd known Raimbaut only through me, and not very well. Raimbaut seemed to appreciate it, but I was embarrassed.

Bieris, who had known him longest of any *donzelha*, was oddly quiet and restrained in the grave, but when she climbed out her face was drenched with weeping.

Then, as each of the boys nicked a thumb to drop blood on Raimbaut's body, Aimeric sang the *Canso de Fis de Jovent*, perhaps the greatest masterpiece of Nou Occitan verse. Written by Guilhem-Arnaud Montanier in 2611, first sung at his funeral a year later, for two centuries it has been what we buried our young, brave, and beautiful to—under normal circumstances it brought tears to my eyes, and now it tore my heart like a claw.

Guilhem-Arnaut himself had said that all four possible meanings (*fis* means either death or end, and *jovent* either a young man or the time of first manhood) were equally intended, and there is nothing in the song to make one choose between them; my mind skipped wildly from one idea to the next, while Raimbaut admired the girls and marveled at the quantities of roses.

At last, when it was over, we walked the six kilometers back in silence. Even Raimbaut was quiet.

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It had been hard and heavy going up with the body, but this was worse.

"Are you still there?" I subvoked to Raimbaut

"Still here." His voice was more tired and mechanical than it had been, and my heart sank with what that portended. "Burial was nice. You're all very kind. Thank you."

At least he remembered the burial. "Raimbaut thanks you all," I said. Everyone turned and bowed gravely toward me, so he could see through my eyes.

"Where am I? I must be dead!" his voice cried in my head. "Deu, deu, this is Montanha Valor, but I can't remember the funeral! Giraut, were we there?"

"Ja, ja, yes, Raimbaut, we were there." I subvoked so hard that Garsenda, beside me, heard the grunts in my throat and stared at me until Bieris drew her away. "Reach for the emblok, try to feel it through me. Your memory will be in the emblok."

It was no use, then or any time later. Only a rare mind can continue after losing its body. Like most, he could not maintain contact with the emblok that would give him short-term memory, or the geeblok that would allow him his emotions, though each was a scant centimeter away from where he crouched in his psypyx at the base of my skull.

As the days passed he forgot his death, and then forgot we had ever been at Pertz's Tavern, for he could not recover what he downloaded.

And as my emotions separated again from his, and he was increasingly unable to reach his geeblok, he felt colder and colder in my mind. His liquid helium whisper raved on endlessly, trying to remember itself, trying to wake up from the bad dream it thought it was in.

After two more weeks—about eleven and a half standays—they said there was no hope, and took the psypyx, emblok, and geeblok off me. They sleep now in Eternity Hall in Nou Occitan, like so many others, waiting for some advance of technology to make them accessible again.

The goodbye had taken so long, and so little of him was left at the end of it, that I felt nothing when they removed him.

Marcabru and Yseut had some appointment they were very secretive about, and could not make the trip to the South Pole, so it was just Aimeric, Bieris, Garsenda, and me. Because it was so late in the summer we made only a day trip of it, springing there right after breakfast to walk the six kilometers to the observation point. At this season Arcturus was very low in the sky as it wheeled around the horizon, its red-orange light glinting off the huge pipelines that ran up to feed the distant mountain glaciers that in turn fed the Great Polar River.

"Those must really be a nuisance to a painter," I said to Bieris. "You can't paint what the landscape really looks like because it's not done yet, and you can't even see what it looks like right now because all those pipes are in the way."

She sighed. "I know. And they don't expect the ocean temperature to get high enough for enough rain to fall here for at least another hundred stanyears. Not to mention that several of the bamboos and annual willows they'll be planting

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in the river bottom aren't out of the design stage yet, so all I have of those are 'artist's conceptions.' And since the 'artist' is an aintellect, their conceptions are really flat and dull. But all anyone wants to see is what Wilson will look like when it's done. By the time it really looks that way, people will be bored with it."

That was a strange remark to make, especially for an artist—after all, the first thing you realize in art history class is that nothing is really any good till it has a few generations of development behind it—but this was a strange trip, anyway. I had really wanted to come so Raimbaut could see this, but they had taken him off me two days before, and since he had no memory why should he see it?

By then, though, Aimeric was wild to go, and he'd gotten Garsenda and maybe even Bieris infected with the idea, so I had to go too. Bieris's bush-sense was as good as mine, but of course they would not listen to her, and it was too dangerous this time of year for them to be in Terraust without someone who knew the territory.

The tower at the observation point was made to look like a weathered old castle keep, with no mortar in the joints between its granite blocks. I suppose it had internal pinning, because it had certainly held together through several grassfires, floods, freezes, and thaws, including being completely covered with snow several times from the look of it.

As we climbed the stone steps, it surprised me how hot the tower was to the touch. Aimeric winced away when he brushed a shoulder against it. "Six stan-years of continuous sun will do that, I guess," he said. "Think what it must be like when the sun first comes up!"

"You're welcome to find out for yourself," I said, "and then you can write and tell me about it."

He laughed. "Don't forget I grew up in Caledony. I know all about cold—it's all they have on Nansen."

It was just a passing remark, but it did startle me; Aimeric rarely referred to his origins, and almost never spoke of his home culture. That and his age were the two topics he would never discuss.

When we reached the top, the sun was almost directly behind us as we looked down into the river valley. The wide steps of the valley slope, broken by irregular cliffs, were brown with dry grass in the sunlight; Arcturus was a deep-maroon clot in the thin blood of the sky, for the fires were already burning in many parts of Terraust. To our right, the pipelines and glaciers sparkled; to our left, the plains reached into the valley, a flat intrusion that made a steep cliff facing us.

We put on distance glasses and adjusted them. "There," Aimeric said, "by that sharp bend—"

I focused in on it. Far below us there were a few hundred aurocs-de-mer at the water's edge, wading in.

As I watched them they would suddenly drop into the water, heads almost submerging as their legs folded up, then swim strongly and smoothly as their flippers extended. With so many entering the water, the river rose almost to its normal mid-season depth.

But not quite far enough. "Look downstream," Garsenda breathed.

In one wide, shallow place, they were

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floundering, at least a thousand of them. The more fortunate ones on the edges extended their legs and ran to deeper stretches downstream; those in the middle were mired hopelessly, some of them clearly already drowned and forming an impassable barrier.

"What will happen to them?" Garsenda whispered to me.

"The lucky ones will drown. The weak ones will starve. And in a couple of weeks at most the fires will finish the rest." With the sky already red-brown with smoke, her question had been stupid.

"I wish we hadn't seen this part of it."

I did too, and put an arm around her, sorry I had spoken in such a cruel way. I noticed a couple of odd scars when her hair pulled back from her ear and was going to ask about them, but then my attention was taken up with Aimeric and Bieris.

They were also watching the doomed herd, still as statues behind the masks of their distance glasses. A fine film of soot covered their cheeks; it was streaked with ivory tear-trails.

I looked from them to the plains, and down into the valley again, and felt Garsenda's warm body against mine —our puny life in the middle of the annual death of a continent—and was about to start making a song about the grandeur and horror of everything when suddenly we all jumped at a loud hooting that erupted behind us.

There on the level ground behind the observation tower was a retriever, just landing. Some aintellect somewhere in the bureaucracy had decided we were about to be in too much danger, and dispatched it.

We hurried down from the tower—delaying your own rescue is very bad form, aside from being a misdemeanor —and as we ran to the retriever, we could see flames and smoke on the horizon behind it. The fires were coming early this year; the stranded aurocs-de-mer below us would burn, not starve.

We stepped through the springer entrance on the side of the retriever and sprang into the huge, cold, echoing reception concourse of Central Rescue.

To judge from the number of people in hiking clothes, fire must have been spreading wildly all over Terraust that day. Some people in mountain gear, a shivering couple in bathing suits, and one extremely irritated-looking diver completed the crowd in the nearly empty concourse.

"Amazing," I said sarcastically. I really would have liked to have seen the fires, at least a little, before the aintellect yanked us out, and no doubt if I filed an appeal they'd give me cash compensation—but they couldn't give me the sight of the fires back. "This place was only built in the six years since we got springers, and already it's the ugliest building on Wilson."

Garsenda giggled and stooped to pick something up; it was a strange little object, a metal ball with pointed spikes of irregular sizes coming off it.

"What's that?" I asked.

"Just an earring." She dropped it in my hand; it pricked me, its little points needle-sharp.

It seemed strange. I'd never known anyone with pierced ears, and it was odd she'd gotten hers pierced without telling

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me. Your *entendedora* is supposed to tell you everything. And the style of the little thing gleaming in my hand looked more like a tiny weapon or instrument of torture, not like any of the recognized traditional styles of Occitan culture. Primitive, even brutal—

"Look," Aimeric said. "The springer is opening to the main station in the Quartier des Jovents in six minutes." He pointed at the board. "It says we spring from Entrance E-7. Where is that?"

Bieris checked one of the maps and snorted. "Other end of the concourse, naturally. We'd better run."

We made it, barely. After everything that had happened, I wanted Garsenda to come up to my place, but she said she had things to do. I watched her till she turned the corner, all that long dark hair swaying like a horse's tail, brushing the top of her full long skirts. It gave me an idea for a song, so I went upstairs to work on that.

That night for some perverse reason the four of us, plus Marcabru and Yseut, all met at Pertz's to drink. It was thirty nights, just about twenty-five standays, since the night Raimbaut had died.

"Forecast says the Dark will start within a week," Marcabru said. He raised his glass. "*Raimbaut: que valor, que enseingnamen, que merce.*" We all drank to him, and I wished again I was still wearing his psypyx, so that this could be in his emblok whenever the technology to bring him back arrived.

The amber glow of the artificial lights made all the colors painfully vivid, like a travel-vu from a G-star system. Most Occitans kept the lights in their homes tuned far toward red, the way the outside light was, but old Pertz was red-green color-blind and would never have seen any color at all if he did, or so he said.

"May every Interstellar die," Marcabru said. "After all those centuries of isolation—with the greatest adventure of all time beginning, and the Thousand Cultures suddenly linked again—the only thing it occurs to them to do is to dress like petty clerks from Earth, forget every bit of culture and history of their own, imitate the lowest forms that come from Earth—did you know that kid you killed was a star in his crowd, Giraut?"

"*At what?*" I asked, flabbergasted.

"He's made a couple of hundred pornographic vus and a dozen or so short subjects. All featuring him beating up and degrading young girls. That's the hot thing among them right now— Interstellar boys walk girls on leashes, or have them wear jewelry that makes them bleed. All clear-cut imitations of Earth sadoporn, completely outside the Charter —as are those stupid swagger-suits, if you ask me. But when people file charges that it violates the Nou Occitan Cultural Charter, the Interstellars claim it's a legitimate protest against the tradition of *finamor,* and go running to the Embassy to have their rights protected."

"Why do the girls *do* it?" I asked.

"Who knows? It's fashionable. And since when has a true Occitan ever claimed to understand a *donzelha*? We just worship them—as we're meant to do." He swallowed the rest of his glass at a gulp. "Anyway, they murdered Raimbaut. Reason enough to hate them."

I glanced around the table. Aimeric

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was nodding a slow, cool agreement, the way he did when he'd made up his mind you were right. Yseut was just leaning on Marc's arm, smiling dreamily as she thought about whatever it is they think about. Bieris seemed very sad, even upset, but I didn't see any more reason for that than for Yseut's smile.

And Garsenda was slowly stroking my leg under the table; that was perfectly in character.

I hated Interstellars too, but I didn't feel like making a speech just then, and besides it was beginning to feel irrelevant. Garsenda was about as young as you ever saw an Oldstyle (to use the ugly Interstellar word for people like us) any more. All the younger people were going Interstellar; in a few years, when people my age were no longer jovents, all of jovent society, the whole Quartier, would be Interstellar.

It seemed such a crime, but there was clearly no holding it back.

My heart stopped for a moment.

I was looking into Raimbaut's eyes, and he was smiling.

Then I realized. Old Pertz had added a vu of Raimbaut to the Wall of Honor, along with all the other dead regulars. The wall itself was real wood—still very rare and expensive, though our culture had been designed to live on the heavily forested island that Nou Occitan would eventually be, and to exploit the forests still being designed for Wilson's polar continents. Probably because of the design, wood fascinated me, almost more than Raimbaut's face did.

"Guilhem-Arnaut never saw a mature forest. Maybe not any forest," I said suddenly.

Marcabru started to make some some joke, but Aimeric had followed my gaze and stopped him with a touch on the hand.

They all turned and looked, then, seeing Raimbaut and the whole Wall of Honor. It was about a fifteen second vu of him; I don't know where Pertz got it from. Raimbaut stared seriously forward, broke into a smile, looked off to the side, seemed to hear something that troubled him, and stared seriously forward, over and over again.

I realized they were all waiting for me to explain what I had said. Garsenda was smiling, arching an eyebrow at me in the expectation that I would honor our *finamor* with some clever saying.

"Well," I began slowly, "I guess it was just the thought that the terraforming robots didn't start working this planet till 2355 or so, thirty years ahead of the culture getting here, and theoretically full terraformation won't be complete until about 3200, so we're only a little past halfway through, right? That means all this time, while we've tried to build and preserve the Occitan culture and tradition, the planet's actually been growing and changing. A lot of what we've done has been in anticipation of things that didn't exist yet. Outside of a botanical garden, Guilhem-Arnaut probably never saw a tree as tall as himself. So when the *Canso de Fis de Jovent* talks about the spring leaves arching over the Riba Lyones—"

"He never actually saw it!" Marcabru seemed more struck with the idea than I was. "But, *m'es vis*, his description of it is so perfect it never occurred to me he hadn't seen it."

Aimeric spoke softly. "I think Giraut

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means that we have all learned to see it the way we do from Guilhem-Arnaut's poem. The world is the way it is—and believe me, I truly love this world—only because we've learned to see it that way. 'Terraust's ancient plain' was still under permanent ice less than 500 years ago, and the 'waves, waves, waves— Ceaselessly beating time—Even as grandfather's little boat—' probably thawed out only a couple of Wilson-years before Guilhem-Arnaut's grandfather's grandfather got here."

I nodded. "Well, we do it too. I've written ballads set in the forests of the Serras Verz—and I was on the first tree-planting crew there when I was seventeen. Right now there's probably not one waist-high conifer, and they probably won't plant the oak and ash that I talk about in the song for another hundred years."

It all seemed very strange. Raimbaut, of course, went right on looking at us very seriously, then smiling, then growing serious again, as he would forever in the vu.

We all poured another glass and drank some more, and agreed the vu didn't do Raimbaut justice—but none of us had a vu of him, so we couldn't offer to replace it. We drank steadily, not yet drunk but meaning to get there, and we were just about to get up and go to some place that would not drown us in melancholy, when the King walked in and headed for our table.

That stanyear it was Bertran VIII, a quietly fussy little professor of esthetics who I knew slightly through my father. The Prime Minister, who looked much better than the King, but just as out of place in the ancient-style *suit-biz*, came right behind him.

This was stranger than anything I had seen in a long time—nobility and a high official walking into Pertz's dressed as if for a court function.

"Aimeric de Sanha Marsao?" the king asked.

"That's me." Aimeric rose and bowed. The rest of us, suddenly recovering our manners, leapt to our feet, along with practically everyone else in Pertz's. The King nodded gravely, all around, and then came forward to speak to Aimeric, gesturing for everyone to sit.

"Officially I should have sent a messenger with a formal *semosta*, but with the Dark coming on they're all at home. I'm afraid I'm here to tell you you're drafted, into Special Services, and we have to talk tonight."

I was beginning to wonder when this hallucination had started. Aimeric was what we called a *tostemz-jovent*, what other people might call a *puer aeturnus* or a Peter Pan. Normally after the first couple of times the Lottery summons you into public service, which will be by the time you're twenty-five or so stanyears old, you're ready to move out of the Quartier de Jovents and up into the main part of the city, to marry, settle down, and take up some serious course of study or life-project. In the back of our minds, Marcabru and I both knew we would. But Aimeric had been through four bouts of service, one just sub-Cabinet, and had always come back to the Quartier. He was about thirty-five physically, in his forties if you counted the years he'd spent in suspended animation on his way here, and he had never

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shown the slightest interest in growing up. He had been my crazy jovent uncle when I was a child and now he was just one more of my jovent companions.

Furthermore, Special Services are emergency non-peerage appointments, not chosen by lot but by qualification —crisis appointments when no one else will do—not exactly a job you offer to an overaged jovent.

But for all the excellent reasons that this could not be happening, it was anyway.

Oddly, the only part that made any sense was the King having to hand-deliver his own *semosta*. When the Dark blew in from the South Pole, and the skies went black with smoke for two to three weeks, everyone preferred to be at home in his own digs—and the Dark was due within a few days.

You don't dodge a *semosta*, either, so we all followed along—Aimeric because he had to and the rest of us because Nou Occitan law allows any citizen to witness any government transaction, and we were all dying of curiosity.

The King indicated we were going to the nearest springer station, perhaps half a kilometer away, and we walked there in silence. I kept trying to figure out what could possibly be going on.

As we all crowded into the springer booth, the King said, "I should warn all of you we're going to the springer at the Embassy. Try not to be too startled at the light—it's officially noon there."

He pushed the go button and yellow light blasted into our faces, hot on the skin and stabbing to the eyes.

Some nervous squeaking Embassy person—my eyes did not adjust before he was gone—guided us to the conference room, where, mercifully, someone had thought to turn down the lights.

We all drew a breath for a moment, taking in the real wooden furniture (grain too wavy to be tankgrown) and the walls covered with vus from all over the Thousand Cultures; some of them seemed to be quite long, several minutes at least.

Garsenda moved forward—only then did I realize she had been pressed back against me—and stood in the hand-on-the-hip pose she used to tell people she was not impressed, especially when she was.

The ambassador from the Council of Humanity had gray hair and a deeply lined face; she wore a plain black uniform, not much different from the Interstellar one. It looked uncomfortable. I wondered how much choice they allowed her in her clothing, and for that matter in her cosmetic surgery. It seemed very strange to me that, knowing our local customs, they had chosen to be represented by a woman—and not just a woman, but an older and frankly plain one.

Her first official action was to order coffee for everyone; it came in just a moment, and there was an alchohol-scrubber tablet discreetly by the side of each saucer. I tossed mine in, and noticed that everyone else did the same.

She gained some points in grace, in my view, by not asking who all these extra people were, but I suppose after six years she knew our ways.

"Please forgive my clumsiness," she said, "but to make sure—the Aimeric de Sanha Marsao I have here is the one

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who was born in Utilitopia, Caledony, on Nansen?"

"The former Ambrose Carruthers at your service," Aimeric said, nodding.

I thought I saw her stifle a very mannish grin; the PM visibly winced and the King blinked hard.

"Good," she said. "Let me explain very briefly why we've interrupted your evening. We have just made our first official springer contact with your home culture; they were less quick in building it than Nou Occitan was, but Caledony now has a springer. Now, you may recall that when the first springer was built here, a few years ago, Castellhoza de Sanha Agnes and Azalais Cormagne returned from Lange to assist in the social transitions—because they had fourteen years' experience with the Springer Changes there, and they were native here. They worked as employees of your government for a stanyear or so, mostly to help you get through the Connect Depression and the growth explosion that followed it."

Aimeric nodded. "I worked with Castellhoza. She was a good economist—I learned a lot. So that's what you want me to do? Go to Caledony and do the same thing for them? I assume you're sending someone to St. Michael as well, at least as soon as their springer opens?"

"Yes—in fact, we're sending Yevan Petravich through the springer to Utilitopia, and then he'll catch the suborbital over to St. Michael from there. Apparently their springer won't be done for another few months."

Aimeric nodded emphatically. "Yevan's a good person for the job. He came here as a missionary, and he's kept that outlook—Nansen is still home to him, and he'll be very happy to get back to his Mother Church in Novarkhangel." He drew a long breath and looked around. The pause stretched out until it seemed it had to tear. Bieris was staring at him as if she'd never seen him before. Marcabru and I were looking at each other, as if one of us would have something to say. The PM had a funny, twisted smile, but the King and the Ambassador were impassive.

Finally Aimeric got up and walked over to the coffee pot, pouring himself another cup. "It's different for me, you see. Very different from Yevan's situation. My whole reason for leaving Nansen . . . well, I was eighteen then, and it's been what—eighteen stanyears of experience, twenty-five stanyears by the clock? a long time anyway—my reason for leaving was that *the trip was one-way*. Because I loved everything I had ever read or seen about the culture of Nou Occitan, and the planet Wilson—certainly that, too. But what I loved best about it—I confess this, *companho*—was that *Nou Occitan was not Caledony* and *it was not on Nansen*.

"So before we talk further at all—*must* it be me? Forty-two of us from Caledony survived the voyage; isn't there anyone who *wants* to go back?"

The PM nodded and cleared his throat. "Eighteen have suicided since. Sixteen are married with young children, and . . . well, you understand why I would not send a family with growing children to Caledony—"

"That's wise and humane," Aimeric said. "So eight are left."

"Three are severely ill emotionally," the PM said. "Six years in the tank, and

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six years in the tight confines of the ship, and then being released into a society that's much freer than the one you grew up in—not everyone can deal with that. Same reason there are so many suicides, I suppose. Of the five remaining, you're the only one with experience in either economics or government, and you're one of three without a serious criminal conviction."

Aimeric sighed. "So it's me or no one?"

The Ambassador shrugged. "We could send people from the Interstellar Coordination Corps—"

"I'll go," Aimeric said.

The Ambassador glared at him. "Those are highly trained people, and while we'd certainly like to have you, I'm sure that—"

"You've *got* to have somebody who knows Caledony," Aimeric said, bluntly. "Your bureaucrats had enough trouble here where things are pretty open and straightforward, with accepting ordinary cultural differences—"

"Well, the ICC personnel at that time all came from Earth, Dunant, Passy, and Ducommon—" The Ambassador sounded unhappy. "That's changed a little—"

"The ICC people that tried so hard to make a mess here have all been promoted since, so they have even more power," Aimeric said. "And an interest in teaching the one true way to the natives does not usually weaken with time. And let me promise you—Caledons will not tolerate one-tenth of what Occitans will." He looked at the wall for a moment, clearly thinking hard, and finally said, "No, you were right to ask. And I have to go." Then a little light came into his eyes and he said, "Who's next in line after me?"

"Faith McSweeney."

I didn't know her, but it seemed to decide Aimeric. "I assume I depart from here? How soon?"

The three of them looked at each other and nodded slowly; for the first time I realized this had also been Aimeric's interview for the job, and that had he wanted to, he could easily have persuaded them he was the wrong man. His choosing to do this seemed very unlike him—but so did everything he had done and said since the King had walked into Pertz's Tavern.

"Departure is from here, yes," the Ambassador said. "Seventeen o'clock tomorrow—I know that's fast, but the sooner we can get you there the better from the standpoint of the Council of Humanity's relations with the Caledon government. Will that be all right?"

Aimeric laughed, the first time I had heard him do so in hours. "Ja, ja, certainly!" He looked directly at the PM and said, "Remember, I run with the jovents, and there's nothing of any importance I would be doing."

The Ambassador seemed baffled, but went on. "Try not to eat or drink three hours before your spring, and you might want to avoid alcohol tomorrow. Apparently springing across a difference of more than a percent or so in gravity upsets some people's stomachs. Your baggage allowance is twenty-five tonnes, so if you like we can just ship everything in your digs."

"That would be good—I've got to remember to pick up my laundry and return everything I've borrowed." He looked around the room slowly. "If

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that's all, then obviously I have a lot to get done. so, *companho*—''

''There is one more thing,'' the Ambassador said, ''and it's possibly relevant to your friends. In the last few years, allowances for people doing this sort of work have gotten much more generous. You may take with you, as assistants, personal aides, or whatever you wish to call them, up to eight friends or relatives.'' The Ambassador's eyes twinkled, and despite her being an official I liked her. ''Supposedly that will help preserve your sanity.''

''Clearly you haven't really looked at these friends of mine,'' Aimeric said. ''Preserving my sanity is not at all what I keep them around for.'' There was a strange sad warmth in his eyes as he looked around the room again.

We parted in haste at the springer station in the Quartier de Jovent, a minute or so later; Aimeric had a lot of comming to do, and the rest of us had to think.

I went home briefly and picked up my lute, playing idly as I considered.

If I went—I'd have two years in another system, something not many people had, since stepping through an offplanet springer was still so expensive. Of course, being expensive was just the problem—the Council of Humanity kept the price directly proportional to energy cost, but since that depended on the square of the gravitational potential traversed, and a simple ski lift of 750 meters cost as much as a beer, it seemed likely that going from orbit around one giant star to another, six and a-half light-years away, would add up to a lot of beer. No, it was a real commitment—if I didn't like it, I would have to serve out my time anyway to get my free ride back, because I couldn't possibly afford to buy passage.

On the other hand, it would give me a highly unusual service record, many new things to see . . . romance and adventure, no matter how dull Aimeric claimed his homeworld was.

And then again—the Dark would be a time to quietly read and think and compose, and following it would come the great explosion of Northern Spring. While Terraust's blackened lands were covered by meters-thick snow, the many steep mountain rivers, and the three freshwater seas, of Terrbori would fill to flood level with the snow melt and the thundershowers roaring up its fjords and canyons. Its meadows would burst out in grass and flowers.

Polar bamboo would shoot up even before the soot-darkened snow could melt, hurrying to begin its climb to ten full meters before the Northern Autumn's fire could destroy it again.

At least I would see Northern Summer—surely I would be back before three years were out.

But I would miss Northern Spring, and I could only really recall one of them. With its twelve stanyear year, Wilson makes a homebody of you—a lucky person might see as many as eight of each season, so missing one was not to be done lightly.

Also, there was my own career. I was, I had to admit, only adequate as either composer or poet, but my performances of other people's work were being very enthusiastically received, and people were coming down to the Quartier explicitly to see me perform.

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The next two or three years could prove critical in gaining a high place among the joventry—and little as the doings of jovents are supposed to matter, the fact was that when jovents hung up their epees, moved to the more regulated parts of town, and settled into the kind of quiet life that my parents led, they tended to keep their friendships and loyalties. A hero among the jovents was likely to be first in line when the best appointed positions in art, politics, or business were being handed out.

Finally, two people weighed in the balance, now that Raimbaut was dead and his psypyx stored: Marcabru, my best friend, and Garsenda, my *entendedora*, focus of my *finamor* and inspiration to my art. Surely no real Occitan could be expected to leave his mistress? Except, of course, out of loyalty to his friends. . . .

The mere thought of separation from either Marcabru or Garsenda seemed unbearable, and for the moment that fact made my decision for me. All for one, and one for all—of course, if they disagreed with each other, then I would have to make up my own mind.

It seemed unlikely that God or fate would permit that, though.

Marcabrun first, I thought, since I could com him. Talking to your *entendedora* on the com is hopelessly *ne gens*, so I would have to go to Garsenda's place in person.

He had an answer, a definite one. "Giraut, I know just how you feel. Part of me is dying to go, too, but the fact is I've got something too exciting to leave. I was going to announce it at midnight, but then we got shanghaied out of Pertz's and all this stuff with Aimeric's appointment came up. You know next stanyear is a Variety Year for the monarchy?"

"Ja, I occasionally com up the news. When I'm stuck in the dentist's office or something. So what?"

"They've picked the variation and the finalists. The announcement will be out in a few hours. Instead of the usual boring middle-aged fart with a bunch of scientific papers or public service awards, it's to be a *donzelha*. And among the finalists—"

I guessed. "Yseut! Marcabru, that's wonderful. Of course you're right—you couldn't possibly go!"

Images danced through my head—a young poet queen, my best friend her consort, thus surely a term-peerage for me and very likely an appointment to the court for Garsenda. These were the kinds of dreams you usually wait twenty years for, and here was the chance to have them while we were young enough to enjoy them.

"With so much that could happen—" I said, and then stopped myself from saying something sure to offend him.

He laughed, having read my mind. "You're right, of course. Even if it isn't Yseut, to have it be one of our generation, a *donzelha* to give the Palace some grace and style—god, it will be exciting to be alive!"

"Ja, ja, ja! I'm going to talk to Garsenda now. Maybe you and I can get together later, and perhaps even go say goodbye to Aimeric. Oh, won't he be furious when he finds out he's going to miss all of this!"

"Let's plan on it," Marcabru said, grinning at me. "Seeing him off, I mean, *and* making him furious. And

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now, Giraut, if you don't mind, you did com me less than an hour after my *entendedora* and I got home—" He let the com wide-angle a little to show me he was not wearing any shirt, and continued to widen it down his naked torso.

"Of course!" I waved a mock salute and turned off the link.

Pausing only to throw on my best cape and pull on my best boots, I sprinted down the winding stairs— elevators spoiled the atmosphere so we only had them when someone in the building had a broken leg and couldn't go through the laundry springer. I kept running through the whole five blocks of narrow, winding streets, crowded even two hours before dawn with vendors; pushed and shoved my way through, and when I got there, she wasn't home.

I pulled out my com and called a location on her.

She was at Entrepot, which was strictly an Interstellar hangout.

Part of the normal stupidity of being a jovent—maybe I should say essential to being a jovent—is that you don't always catch on very quickly. One part of my brain remembered the number of times in the past few weeks when she'd been unaccountably missing (of course I hadn't called locations on her then because it hadn't been urgent, and to do so would have been a mark of distrust). Another part reminded me of that weird, ear-scarring jewelry. Still another whispered that Garsenda was very young, even for eighteen, and was always the first one onto any trend or fashion. . . .

And the main part of my brain just shouted them down and headed me for Entrepot, as quickly as I could go while keeping any dignity.

It took me half an hour to walk there. When I got there I called another com and it said she was in a back room, so I followed the walkways around, enduring the catcalls and kissy-noises and shouts of "Grandpa wears a dress!" from the young Interstellars hanging on the railings, and headed for that room. Some part of me insisted on knowing.

Garsenda had always been attracted to the arts—or rather to artists. And in just one way, the Interstellars were true Occitans—they valued their artists. So naturally when she decided to start climbing the other social ladder behind my back, she had joined their equivalent of the arts scene.

Which is why when I opened the door, there were three cameras running (one automatically focused on me as I stood there). What they were filming was Garsenda, wearing thigh-high spike-heeled boots and nothing else, her head thrown back in a pose of ecstasy while a boy crouched in front of her, sucking one nipple and clamping the other with what looked like a bright orange giant pair of pliers out of some cartoon. Neither of them noticed me, so I closed the door and left. Probably she'd recognize me in the shots from the third camera, and that would be enough.

I wasn't sure, and hadn't wanted to check, but I thought the boy might have been one of the ones who fought us the night Raimbaut died.

On my way out someone insulted me; I drew and cut him down without any warning, a hard slash across the throat. Technically you're entitled to do that. It didn't make me feel any better, so I

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used my neuroducer to stab one I thought had made a face at me, right in the kidneys, and sneaked a very real kick at his head as he fell. Even that didn't offend his friends enough to overcome their terror (I suppose I must have looked pretty alarming in that mood) so I had to leave without any sort of brawl to either work out my rage or put me into the hospital.

As I strode into the street, I tried to formulate some plan of action. In the days before the springer had brought all its changes, just six stanyears back, my choices would have been fairly simple: I could kill myself, or wait and apply to leave on one of the ships that departed every ten stanyears or so.

Nowadays there were no more ships. For most people that left suicide—but not for me, I realized.

I commed Aimeric. I had walked just six blocks from Entrepot.

He said I was welcome to come, and even seemed grateful. He gave me another code to com.

At that number, I arranged to have everything in my apartment shipped, my accounts liquidated to pay my bills, and that sort of thing. They told me I wouldn't need to do anything—I could just walk out of my apartment, go to the Embassy, and depart the next day. They would even pick up my laundry. They reminded me it would be at seventeen o'clock.

I thanked them, set the alarm on my wrist unit for sixteen o'clock (enough time for an anti-alcohol tab to straighten me back out), went to the tavern nearest the Embassy, and worked hard on getting drunk all that morning and afternoon. I swallowed the pill on time, and got to the Embassy OK. Apparently to make sure, they gave me a huge anti-alchohol injection—whatever it had against alcohol, it had no quarrel with hangovers—scrubbed me up, and generally made me feel like a dirty kitten pinned down by its mother.

Along the way I babbled out a confession about what had happened to Aimeric and Bieris. Bieris kept telling me Garsenda was just a kid having fun, and Aimeric kept telling me I could get out of this if I really wanted to, that there was still time and all I had to do was say I didn't really want to go.

I shook them off. My head was pounding, the blinding yellow glare of the Embassy lights was making it worse, and now that I was sober I was painfully aware that I hadn't eaten all day. "So I might throw away two stanyears of my life. So what? I *was* just going to kill myself. And at least this will be completely different from Nou Occitan."

"Oh, it will be that," Aimeric agreed.

Bieris bit her lower lip. "Giraut, we've known each other since we were children. Tell me the truth. Is it really between this and killing yourself?"

I was more offended than I'd ever been before. "*Enseingnamen* demands. This is the gravest sort of violation of *finamor*—"

She turned to Aimeric, shaking her head. I noticed that somehow she seemed much older, though she was still the same laughing brown-haired beauty who had been my friend so long. "I think he means it."

Aimeric nodded. "I'm sure he does. We've both known him a long time. So we let him do it?"

"You're not *letting* me do anything,"

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I said. "You issued the invitation honorably, and I want to take it up."

Aimeric sighed and fluffed out his shoulder-length hair. "And I certainly don't want to fight you about it. All right, come on. You're a bright enough fellow, Giraut, when a *donzelha* isn't involved, and I can certainly use you. But I'm warning you one more time—if Caledony is anything like I remember, there are going to be a lot of times when you will wish you had stayed here and killed yourself."

Maybe something in his tone finally got through to me. "How bad can it be? What's discomfort in the face of shattered love?"

He didn't answer, though—just turned away. I thought he was a little disgusted, for some reason or other. He was sometimes strange that way. Bieris gave me one worried, pitying glance and went over to talk with Aimeric some more.

When the time came, we just stepped through the springer like any other springer, this time going from one group of boring Embassy people to another. There was a slight, funny shoving sensation on my feet, and a downward tug on the rest of my body, because the gravity was about 8 percent higher on Nansen than on Wilson, but otherwise I might only have stepped into the next room.

Aimeric staggered as if he'd been punched in the stomach; I actually had to catch Bieris, who retched a couple of times before regaining her composure. From the way they looked at my apparent immunity to springer sickness, I think they were wishing I had stayed home and killed myself.

"Welcome to Caledony," a tall, older man said. "I'm Ambassador Shan. Which of you is Ambrose Carruthers?"

"If anyone were, it would be me, but I use my Occitan name of Aimeric de Sanha Marsao. This is Bieris Real, and Giraut Leones, my personal assistants."

Shan nodded. "I'm delighted to meet you. I'm afraid staff and space are in *very* short supply here—we just grew this building in the last forty-eight hours, and there's much, much more to do in the next week—so we'll simply have to send you to your new homes, and send your effects after you as soon as they arrive. I'm sorry we've nothing to offer in the way of hospitality, but our talks with the government of Caledony regarding the supply of the Embassy have stymied completely."

"Meaning either they want to charge you for it, or they want you to work for it," Aimeric said.

The ambassador nodded. "I was hoping that what they were saying was just a polite form, and whatever they really wanted would emerge from the discussion. But they really do mean that?"

"They sure do. Try not to be surprised if they tip you when the deal is done, either. Anything more than two hundred utils is excessive and might be a bribe."

"I can see you'll be invaluable here."

"In Caledony, nothing is invaluable. It's the one place in Human Space where everything, absolutely everything, is valued." Aimeric smiled when he said it; Shan laughed and agreed with Aimeric, leaving Bieris and me completely mystified.

We went into the next room, where some Embassy flunkies gave us knee-

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length, insulated parkas with what appeared to be transparent facemasks. That was some warning, I suppose, but nothing could really prepare anyone for what was outside.

It was like walking into a totally dark cryogenic wind tunnel. Water sprayed my beard and mustache and froze instantly.

I realized what the mask must be for, and pulled it down, but not before getting two searing-cold chlorine-reeking lungfuls of air. The wind shoved on my chest like the end of a post.

"Don't worry, *companho*," Aimeric shouted to us over the moaning booms of the wind. "It's just we've arrived during the morning storm. It gets much nicer toward afternoon!"

I didn't see how it could get any worse, and I had done a lot of skiing back home in the North Polar Range.

"How much chlorine is in the air?" I shouted.

"Plenty, right now. The morning storm is salty from what blows off the bay. This must be our ride coming up now in the cat."

A "cat," I realized, must be the big treaded tractor now approaching, its cab lights reflecting off the low dark buildings all around us. "Where is everyone?" Bieris shouted. I could barely hear her.

"Inside! They aren't crazy! They'll come out when this lifts, in another half hour or so."

She shouted something and then repeated it in a near-scream. "I meant why are there no lights in the middle of a city?"

"Why turn on a light when nobody's out? And why have windows when there's nothing to see?" Somehow Aimeric managed to put a shrug into his shout.

The cat came up then, and I thought I knew why it had that name; all the little maglev lifters that kept its tread moving were humming and whining at different pitches, and the wind was whistling through the centimeters between the treads and the lifters. The total effect was like the wail of a gigantic cat hurled into the deepest pit of hell.

We climbed up the steps that extended down from the cab, and the outer door swung open (I was quick to learn that every entrance on Caledony had two doors, and that the height of unspeakable rudeness was to hold both open.) We crowded into the cat's little heatlock and Aimeric closed the door behind us; then the inner door opened.

Aimeric paid the driver. I was startled; Bieris glanced at me as we shucked off the heavy coats.

Then Aimeric roared with laughter and threw his arms around the driver. "By god, Bruce!"

"Yap. Really afraid you wouldn't remember me."

"Hah! You're the first piece of good news in a while." He introduced us to the older man, who it turned out he'd been a student with.

It took me a moment to realize that Bruce hadn't been one of Aimeric's teachers. Aimeric's six and a half years' suspended animation weren't all of it, by any means—Bruce's skin had a strange, leathery quality and was spotted with brown flecks, and his hair, where not grayed, seemed to have been erratically bleached to a pale flatness.

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I wondered if the chlorine in the air had done that.

For a long time, they talked about all the things people do when they haven't seen each other for a long time—and since they had two decades of stanyears' catching up to do, the conversation stretched on for the full hour it took us to get out of Utilitopia. There's no one city that big in Nou Occitan—by design, we build new cities after old ones reach a specified size, so that with the slow changes of architectural style, each city will have its distinctive look. Here, they just kept expanding Utilitopia.

As we drove and they talked, the storm dwindled down to a simple freezing rain, and the outside temperature gauge climbed to almost freezing point. The streetlights came on, revealing that most of the buildings looked like simple concrete boxes with forward-pitched roofs; all churches seemed to be identical, with a very low narthex and very high double-peaked transept, so that they seemed to be about to plunge down into the street like birds of prey.

There were a lot of churches.

Every now and then, a trakcar would glide by on the maglev strips in the streets, its headlight tearing through the fog and suddenly bringing up the color of the buildings—which seemed to be either blue-gray or brownish-red. Though I had grown up riding trakcars, they seemed quaint and old-fashioned to me now; it made me a little sad to think that here too they would no doubt disappear within a year, replaced by springers.

I wondered if they would take out the trakcar strips, or leave them in place. In Nou Occitan we had made them into pathways for bicycles, skateboards, and row cars, with brick planters to control access surrounding them—but that did not seem in the spirit of things here.

I had thought that we had been passing through an industrial district, like those in pictures from other planets who didn't have the common sense to leave all that to robots and put the operations somewhere uninhabited, but when we topped a rise and the fog was briefly up, I could see clearly that the whole city seemed to be made of these concrete blocks.

At last we were out of the city and driving along a road; to my surprise, it was simply scraped rock, the thin soil cut away and the rock smoothed to form a roadbed.

I was about to ask about the primitive look of the road, but then Bruce said, "I guess I ought to ask. Your first letter said Charlie had died."

"Yap." Aimeric said, without volunteering more.

Bruce nodded slowly, just as if Aimeric had told him a great deal. "I haven't been to church in ten years," he said, which seemed to have nothing to do with the subject. "And since you didn't come in as Ambrose—"

Aimeric interrupted. "Wait a second. *You* haven't been to church—?"

Bruce shrugged. "I—well, you know how it went. You and Charlie got to go, but I lost out—there were fewer slots on the starship for preachers. And so for a while there I got to resenting God for calling me, and then giving myself the scourge for resenting God. Made me into one of those bone-mean fanatics that always seem to get hired for the backwoods. That was when I wrote the last letters you got from me. . . ."

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"Yap."

We came to a fork in the road; with a slight rise in the pitch and volume of the hum, a sharp pull to one side, and a wild spray of dust and gravel, the cat turned upward beginning to climb switchbacks. In the fog I had no idea what we were headed toward, and without the city lights, it was terribly dark again—visibility couldn't have been more than thirty meters, even in the cat's headlights.

Bruce went on. "Well, after that I got worse for a while. It felt *right* at the time, of course, because if you really think all this stuff is true, then obviously there's no excuse for compromise or even compassion. I had a congregation up by Bentham, and I spent about three years causing all kinds of misery by enforcing every jot and tittle.

"Then one morning . . . something happened. Just one of those things where I had to realize that I was causing, not curing, unhappiness. I went back to my quarters. I prayed for a while—well, about a month, actually. And when that didn't work I quit the job, bought a farm over in Sodom Basin, and I've been there since." We came around a tight turn and gravel sprayed from under the spinning tracks, making a strange distant chatter against the bottom of the cat's cabin. There didn't seem to be anything at all, except dark fog far below, under my window. "I had to really lowball the bid to get to pick you up—they wanted someone more doctrinally correct."

"Sodom Basin is a long way away," Aimeric said. "That must have made it hard to justify your bid."

"Nope. I rationalized it by packaging the contract. I'm your landlord."

Aimeric seemed struck dumb for a moment, then burst into a delighted crow.

We came over a rise and down a short, steep drop in the road. For a bowel-yanking instant the headlights pointed down into a seemingly bottomless gorge; then gravel sprayed again and we were running up a ledge on the canyon wall.

Since neither Aimeric nor Bruce was acting like anything unusual was going on, I wasn't going to. I looked away from the window to see how Bieris was taking it, and found her almost on my lap trying to see out the window.

"How far down do you suppose it is?" she whispered.

"*Non sai*. It's a long way though."

"That's the Gouge you're looking into," Bruce said. "It's a long fjord—the bottom is sea water, almost 80 meters deep. We're probably 3,000 meters above that right now, and we're going up to 7,300 to get through Sodom Gate. This whole thing is a big crack in the crust from an asteroid strike."

"An *asteroid* strike?" Bieris leaned forward, toward Bruce.

Alarmingly, he looked away from where the headlights bounced and danced up the narrow road in front of us, and turned to talk to her. "Yap. But don't worry—we're not expecting another one soon. Though this one is recent. Probably less than a thousand years ago. I guess you people didn't come here with much warning about what you'd all find?"

"None at all," I said. "Does it all look like this?"

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Bruce roared with laughter, and Aimeric joined him. "A very polite way to voice your concerns, um—Grot?"

"Close. Two syllables—like gear-out."

"Giraut." He got it right that time. "Anyway, it's no wonder you've been so quiet. No, the Council of Rationalizers wants to keep people in Utilitopia for greater efficiency, so they have a high tax on any activity that could be there and isn't. I wasn't really enthusiastic about farming when I started, but it was the only job that would let me live on the warm side of the Optimal Range. It'll be another two hours till we get across the mountains, but I think after that you'll be pleased with what you see."

"Why do they name it 'Sodom Basin,' if it's pleasant?"

"So those of us who insist on living there will know we're showing an irrational attachment to incorrect values," Bruce said. "We've put ourselves on the road to spiritual destruction." He sounded more tired than angry, but I decided it was time to drop the subject.

"For those of us with no patience," Bieris said, "just what is this place we're going to?"

Aimeric nodded at her, as if thanking her for the change of subject. "The mountain range that the Gouge cuts into, and Sodom Gap goes through, runs along the eastern coast of Caledony. On the other side is Sodom Basin, a salt-lake basin. It's one of the warmest places on this crazy planet—I'm sure you'll be appalled to know that you're less than half a degree south of the equator at the moment.

"What happens is that the Sodom Sea creates a huge heat sink, and because the mountains are high enough to block most of the clouds from blowing in, it gets lots of sun. Keeps the whole valley warm—normally it only goes to freezing for a couple of hours out of each Dark."

"How do you get Darks here? Surely there isn't enough vegetation to burn—"

"Means something different locally," Aimeric explained. "Nansen only has a fourteen-hour day. It's easier to put two of them together than to live on a fourteen hour schedule. So the day divides into First Light, First Dark, Second Light, and Second Dark. Right now we're about twenty minutes from First Light."

I looked at the dim, glowing fog outside and said "It looks very close to dawn—so where's all the light coming from?"

"The moon just rose," Bruce said, "what else?"

There was a long awkward silence. We felt stupid, of course, for not having remembered that Nansen had an ice-covered close-in moon that would be very bright and big in the sky; Bruce, I'm sure, felt stupid for not remembering that Wilson had none.

Bruce made an overture. "So what prompted either of you to come to Caledony with this old reprobate? Isn't there enough fog and sleet for you anywhere on Wilson?"

Bieris laughed softly. "You could almost say that Aimeric talked me into it."

"I was trying to talk you *out* of it! I said it wouldn't be anything like what you were used to, and you wouldn't be able to do even half of the things we did

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for amusement in the Quartier." Aimeric sounded really pained and distressed. "There really aren't a lot of people here who are anything like your friends back home."

She was nodding her head vigorously. "*Ja, ja, donz de mon cor.* After all the strong reasons you gave me for coming, how could I be expected to resist?"

I had a sense that she was teasing or needling him, somehow, but I didn't get the joke either, and in fact I was a little alarmed by the things Aimeric had just said.

"You're not going to meet anyone here who understands that you're a *donzelha!*" he protested.

"Oh, I don't know. Bruce, what gender would you say I am, just offhand and from surface indications? Just give me your best guess."

Bruce laughed, sounding very nervous, and suddenly seemed to need a little more of his attention for the road. "I never get into arguments between people of opposite gender," he said. "Part of why I'm still healthy and vigorous at my age."

Aimeric chuckled a little, and said, "We really did need you along on the ship, Bruce. A diplomat like you was wasted as a preacher."

That seemed to lead to a very long silence before Bruce asked what had brought me to Caledony. Without too much detail—I had an idea that describing what I had found at Entrepot with any precision would probably have upset him—I sketched out how I had ended up in the springer to Caledony.

To my surprise, unlike Bieris or Aimeric, he seemed to understand at once. I warmed to him immediately—or at least I did until he added, "Yeah, it was a long time ago, but I had something like that happen to me, with a girl that *I* had been planning to marry."

Aimeric sat up as if he'd been goosed; Bieris was suddenly choking; I was left having to do the explaining.

"Ah . . . marriage isn't even legal in Nou Occitan till you're at least twenty-five stanyears old. It's not common before you're thirty," I said. "This was—well, *finamor*." I had the sudden embarrassing realization that I had never actually learned a Terstad word for it. Maybe there wasn't one.

Bruce nodded emphatically. "You know, in all the reading I did about Nou Occitan, years ago, when I was trying to get to go on that ship, I never did really get a handle on the idea of *finamor*." We spun around another turn and I avoided looking out the window, knowing perfectly well that there was truly nothing to see below me. As he brought the cat back onto a smoother path, Bruce added, "But I can surely understand that you felt like doing something big and sudden when something so important to you got wrecked." He hesitated. "Um—there is something I'm curious about though."

I was so grateful to be getting any kind of understanding—even from someone who apparently didn't know what I was talking about—that I said, "Of course."

"Well . . . if you're *not* going to marry a girl, why do you get into an exclusive arrangement with her?"

It seemed a very peculiar question to me, but Aimeric's friend clearly meant it sincerely, so I tried to answer. I stam-

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mered out a lot of not-very-coherent things about inspiring my art, giving me a purpose to place my *enseingnamen* at the service of, helping me to the sweet sense of melancholy . . . it sounded dumb to me.

"Well," Bruce said, "actually that does sound like fun. I can see where spending a few years that way would be interesting, at least." It sounded as if I had confused him completely but he at least understood that I loved it, and again I was deeply grateful. "Uh—but what do the girls get out of it?"

The question was so startling—I had never thought of any such thing before—that I blurted out the truth: "I really don't know."

Bieris broke in, to my annoyance since I seemed to be getting on so well with Bruce, and said, "Well, we get attention, and we get to feel proud of ourselves because we're doing things we've been encouraged to fantasize about ever since we were little, and every so often we get sex, which is fun."

"That's awfully cold-blooded," Aimeric said.

He had a gift for understatement; I was so angry I wanted to shout at her, but you don't do that to someone else's *entendedora*.

Something about the way she flipped her hair and shrugged, for some reason, suggested the style of a couple of Sapphists I had known; since they tended to be very aggressive and often treacherous fighters, and delighted in scrapping with jovents over any possible issue at all, I avoided them. Not that Bieris was wearing man's clothing, as they did, or even that she had spoken in the dominating, quarrelsome way they did—but something about her manner reminded me of them, of how dangerous it was to fight with them. And after all, she was Aimeric's *entendedora*, not mine. I was still annoyed about her breaking into my serious discussion of *finamor* with Bruce, but I decided I would just sit on the sidelines for this clash.

"Well," Bieris added, "it's also true that unless one has some special talent or study to pursue fulltime, there just isn't a lot to do before you're twenty-five. So I suppose *finamor* also gives us something to do."

Bruce nodded a couple of times, and I realized that for some reason he had believed her. I would have to find a chance to give him a better, less ugly, explanation, later.

As soon as I thought of one. Bieris's accusation against *finamor* was so wild, and so bizarre, that I had no idea what to say just immediately.

I noticed that Aimeric was slumped in his seat and realized that he must be dying of embarrassment, as I would have in the same situation.

After a while Bruce said, "Well, I don't imagine you'll find anyone here who will be interested in exactly that arrangement, Giraut, but we do have women, if it's any consolation." I think he meant it as a joke, but I couldn't think of any way to pick up on it, and neither Aimeric nor Bieris did, so it just lay there. The only sound was the hum and whine of the treads, and the faint sputtering of sleet against the windshield and cabin roof.

The conversation was now thoroughly cold and dead. The moon, and

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perhaps the sun itself, were beginning to turn the fog a pale yellow around us, enough so that we could see the many little frozen waterfalls and the heavy rime on the rocks. The temperature gauge had still not quite touched freezing.

"Something must have really gone wrong with the terraforming," Bieris said. "You must be way behind schedule for reaching planned temperature."

As we whirled around another high, hairpin turn, Bruce and Aimeric looked at each other, obviously trying to settle who would explain it. The cat slipped a centimeter or so sideways toward the edge. The gray down below seemed to be lightening and getting a little farther away; I wondered, in the higher gravity, how long it would take to plunge all the way to the sea below.

It was beginning to penetrate my hung-over, sleep-starved brain that Noupeitau had been the home of many great-looking, traditional *donzelhas* who were not Garsenda, and that I was now going to be in this icy waste for a stanyear or two. The great advantage of suicide is that no matter how stupid and shortsighted the action is, you don't have to be aware of your stupidity afterwards.

I was working up from that thought into a full-fledged depression when Aimeric cleared his throat and said, "I did try to talk both of you out of this, you know, but now that you're both here, maybe I should just—well, all right. I guess the way to say it is . . . um, I mean—"

"What Ambrose—sorry, Aimeric, I mean—is trying to tell you," Bruce said quietly, "is that most people here want it to be like this. And this planet was not terraformed. It came this way."

They had time to tell us the whole story before we reached the Gap.

Nansen was bizarre in many ways, but the strangest feature was that it should have been a prime candidate for terraforming—potentially it could have been within 1 percent of the so-called Tahiti-Standard Climate, far better than Wilson was.

But a simple loophole had made it possible for the two cultures here, Caledony and St. Michael, to enjoy the wretched climate that both preferred for ideological reasons.

Technically Nansen could avoid terraforming because it had already been a living world when the probes got here. The explanation, as far as it went, was that around our stanyear of 1750, the asteroid that created the Gouge had torn a hole in the crust of Nansen. The impact and the vulcanism it spawned had blackened the glaciers and ice sheets, and immense eruptions of greenhouse gases had further warmed the planet. In addition, the large releases of sulfuric acid had started the calcium sulfate-sulfide cycle in the oceans, turning them over and beginning the circulation life would need.

And that was where the mystery started; it was understandable, though very improbable, that Nansen had accidentally started its own terraformation without human intervention—but where had the life that continued the process come from? Exobiologists fought over the issue with great passion and little in the way of conclusions.

When Nansen's star, Mufrid, had

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swelled into a giant, as in practically all such cases, the Faju-Fakutoru Effect had stripped its gas giants of volatiles, leaving their habitable-sized cores in the process, and the very wide habitable zone of a giant star had virtually insured at least one world would fall within it.

But normally, after liquefying, recooling, and forming their new atmospheres, such worlds either froze, as Wilson and Nanseen had; boiled like Venus; or became lifeless hell-holes with many small briny seas and an inorganic nitrogen-CO_2 cycle atmosphere. In their short lifetimes of a few hundred million years at best, they did not usually begin life—instead they waited, inert, until someone came along to seed them with organisms and begin generating the series of ecologies that would move them to human habitability.

Nansen had not waited. In the late 2100s, the first human probes to reach the planet had found a flourishing, photosynthesis-based microbiological ecology. A complete absence of any fossil forms, and cores later drilled into the remaining primordial glaciers, had shown that life must have arrived very recently, or been almost absent until the asteroid strike created the opportunity.

Where the life had come from boiled down to four theories:

First, Mufrid's now-destroyed inner worlds had harbored a civilization, a few members of which had made it to the stripped gas-giant, where their efforts at terraforming had failed, leaving low populations of a few simple organisms in the never-quite-frozen oceans —populations which exploded when the asteroid gave them the chance. This was clearly impossible because by the time the volatiles were gone, the inner worlds would have been engulfed by the expanding star for at least two million stanyears.

Or, since that was impossible, the second theory was that an unacknowledged probe from one of many defunct Terran governments had contaminated Nansen. This was impossible because to produce the results observed by the first known probes, such a probe could not have left much later than 1825.

Rejecting those, a few scientists contended that the gas giant whose core had formed Nansen had been warm enough to harbor life of its own—which had then somehow survived the sudden removal of 90 percent of the planet's mass, made its way to the core, and survived in the molten iron soup for decades as the gas giant's former moons, now in eccentric orbits, socked into the new molten planet every few hundred stanyears.

Since that also couldn't be true, there was a notion that the non-human civilization we still had yet to find had discovered an easily terraformed planet at the enormous expense of an interstellar probe, started the process of terraformation at even greater expense, and then not bothered to move in, perhaps on a whim.

"Every one of those ideas is ludicrous," Bruce said, "but there you have it—Nansen was alive when we got here." He shrugged. "Which meant the cultures that bought land on it could invoke the Preservation Regulations—no additional terraformation, just species addition."

Aimeric sighed. "And just to make sure you both understand how grim that

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is—if you check the historical documents, you'll find out that a variance was theirs for the asking. Nobody who designed or founded St. Michael, or Caledony, wanted it to be any other way."

Mufrid had risen behind us by now, and there was much more light; the sun itself was a bright yellow smear in the dingy gray behind us. Little pellets of blown sleet bounced off the windshield, and I could see a couple of hundred meters down into the Gouge, and even dimly make out the far side as a dark spiky shadow. Colors were starting to appear in the rocks.

"But maybe I'm slow," Bieris said, "why didn't they want it to have decent weather?"

"Oh, two different reasons, one for each culture," Aimeric said. "St. Michael needed a bleak, gray place for human beings to do hard, pointless physical work in, so that they could properly contemplate the essential sadness and futility of life and therefore appreciate Christ's glorious generosity in releasing them from it."

Bruce suddenly pointed. "Hey—look. The Gap Bow." All of us leaned forward to look through the windshield. There in front of and above us was the biggest double rainbow I had ever seen, and unlike the simple red-to-green ones of Wilson, this one extended all the way to deepest violet. "You'd have to ask a meterologist how it works," Bruce said. "Something about the way clouds form in the Gouge. It only happens at this time of morning, up at this altitude, maybe every twenty Lights or so."

"Deu, it rips my heart," Bieris said. "Surely someone here has made a symphony or a hymn of it—that would be wonderful to hear!"

There was an embarrassed cough from Aimeric. "Um, perhaps some hymn would allude to it in passing."

Bruce sighed. "I don't think they'd even allow that. Concern with appearances is the first of the Nine Indicators of Misplaced Values. And the Gap Bow is pure appearance, from the viewpoint of those people."

We didn't ask who; I for one figured I would not be able to avoid finding out, and saw no reason to rush the process.

Besides, there was the Gap Bow itself to see. After the black dirty saltstorm from which we had started, and the drizzling gray climb along the bare rock walls, here in the glorious amber light under the turquoise sky was that brilliant blazing stripe like an immense, graceful bridge across Sodom Gap in front of us.

It lasted for several minutes as we climbed; meanwhile, the cabin actually began to be a bit warm from the sunlight. My eyes had adjusted—though the colors of the rock layers still seemed garish to me, the pain I felt in looking at them was only esthetic.

When the Gap Bow had at last disappeared, all of us sighing to see it go, Bruce said, "Not far now." He brought the cat around another bend and around a small draw that entered the Gouge there.

The last fifteen kilometers of road winding up into the Gap was along bare, scoured rock ledges, some natural and some blasted. At their widest they were about eighty meters, and at their narrowest only thirty, about twice as wide as the cat. By now the sun was halfway up to noon, and the clouds in the Gouge

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were so far down that I had to press myself against the window to see them. Opposite us, four kilometers away, Black Glacier Fall plunged into the Gouge—"it falls only during sunlight," Aimeric said, "and it all freezes into hail on the way down. From one of the outcrops on the other side, you can look all the way down to the green sea through the hole the hail makes in the clouds."

I thought privately that I might just decide to pass the sight up.

To protect the ledges of Sodom Gap Road, great needled vines had been engineered and planted on the cliff faces, so on our side the vertical slopes were covered with tangled wood as thick as the trunks of mature trees, forming a latticework several meters deep.

"Does anything live in that? Squirrel or monkey analogs?" Bieris asked.

"Escaped chickens," Bruce said. "We'll probably see a couple before the drive is over. They were bred to have huge breast muscles and wings like condors, and to feed on the lichen that grows all over the planet. The idea was to raise them as sort of a free-range meat animal. Well, they do eat lichen, plus anything else they can get into their beaks, but they really prefer the needles on those vines—and up here they're hard to get at."

We came around the bend and two visibility-orange chickens, at least two meters in wingspan, swooped past us. "That's them," Bruce said. "We bred them to be easy to spot. Still doesn't help when you're hunting them. Fifteen kilos of meat on them, dressed out, but it's work to get them—nothing in their genes to make them go into a trap, and if you shoot one up here he tends to drop straight down into the Gouge. Only use we get out of them is the guano."

When we finally climbed up the last slope to the top of the Gap—still between mountains that towered almost a kilometer above us on either side—Bieris and I gasped audibly and Aimeric seemed to get a little water in his eyes. The last bit of the Gouge had broken into a saddle between two mighty ice-clad peaks.

From where our cat whirred along the rocky surface, at the top of the Gap, bare rock stretched forward a full kilometer before plunging out of sight.

Beyond that rim, a broad plain of deep blue-green, broken by tawny gold grain fields and the paler green shimmer of orchards, reached to the jagged peaks of another mountain range far beyond. I guessed that perhaps the other mountains might be 200 kilometers away.

"Anc nul vis bellazor!" I exclaimed, drinking in all that color after the barrenness of the journey.

"Ver, pensi tropa zenza," Bruce said.

Bieris and I giggled; Aimeric burst out laughing. "You realize you just lost your best chance to spy on our Occitans, Bruce."

"Avetz vos Occitan?" Bieris asked.

"Ja, tropa mal." Bruce sighed. "Nowadays I'm way out of practice. But I thought it was only fair to let you know I could understand your language."

"The three of us spent a lot of time practicing it," Aimeric said.

"Yap, you and me and Charlie. In fact we even practiced it up here a lot."

Aimeric sighed. "I had almost forgotten."

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I had known Aimeric for almost a full Wilson-year—just a bit less than twelve stanyears—since he had stayed with us, just after his arrival in Nou Occitan. And in all that time, I had never heard him speak of this Charlie, who had apparently been one of those who died in the tank on the way. Yet clearly they had been very close friends, together with Bruce. . . . I wasn't sure I liked knowing that Aimeric had been able to forget his friend so completely.

Bruce was nodding. "I guess I'm still pretty amazed that we got away with it."

Bieris looked from one to the other. "It's illegal to take a hike?"

"Not illegal, but irrational. After you do it you have to prove you're not out of harmony with God's plan for your life," Bruce explained, making it completely confusing.

"Why is it irrational?" I asked. "Anyone who got up here ought to be able to see why you would do it."

"Mere aesthetics are beyond reason," Aimeric said. His voice had a cold, ugly edge to it and a deep flatness that sounded like some peculiar accent. Without knowing who it was, I knew he was imitating someone's voice.

"Since you can't prove it's good, it's got to be a matter of individual taste. And matters of individual taste are not supposed to be your first priority," Bruce said. "But we did manage to get around it. Once we thought of doing this, we spent almost a year establishing a walking fetish."

Aimeric laughed. "Walked to everywhere we could, every chance we got. We had them convinced that the whole planet would double its aggregate utility total if only we could get to walk more."

"The last three trips or so we made, we spoke Occitan exclusively," Bruce said. "It really is a better language for dealing with beauty. Of course, those were long trips and harder to get permission for—it's a good five days, or ten Lights, really, to get over into Sodom Basin—so that was later on. Just as well since we were about the only people who had ever done any hiking or camping in Caledony, and we had to teach ourselves everything by trial and error. Sodom Gap would not have been the right place to try to learn—it isn't what you'd call a low pass."

"How high up are we?" Bieris said. "Or were we—I mean, how high is the top of the pass?"

"About seven kilometers," Aimeric said. "But the temperature and pressure gradient is much less steep than on Wilson—you can breathe up here, easily, without carrying oxygen, and though it's terribly cold it's not all that much worse higher up than it is lower down."

By now we had driven down to where we could see the way the road tumbled down in a series of steep switchbacks to the valley below.

As we descended we left behind the heavy retaining vines and saw more long grass. "That's *wheat!*" Bieris exclaimed suddenly.

"Yap. Practically every engineered plant in Caledony, even the cover crops, is edible or good for something. Part of making it all maximize happiness," Bruce said. He threw us around another tight bend, and we lurched down the brightly sunlit road, a rooster tail of dust springing up after us. Now that I could

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see, and had ridden with Bruce for almost three hours, I was beginning to enjoy the way the cat zoomed along the mountain road. "This whole part of the planet is one big farm. One reason we don't trade much with St. Michael is that over there, to make life more rugged, they engineered weeds. We're crazy here, but not that crazy."

As we came down into the rolling hills that ran along the eastern side of the Optimals, I saw that all the trees had been machine-planted in long straight rows, so that what had looked like a forest from far away looked more like an orchard planned by an obsessive-compulsive gardener close up.

"I bet all these trees are seedless," I said.

"Yap," Aimeric said. "That way trees grow only where they're planted, and with very little genetic drift, machines can pick them on a regular schedule."

When we slowed to a stop at Bruce's house, I was not surprised to see a bare concrete cube—"Hey, you've got windows!"

"Yap. Took me three stanyears of complaining to a psyware program that I had claustrophobia—in fact I really did develop it a little bit—before they decided it was rational for me to want them. But you're all in luck—by a slightly elastic reading of the building permit, I had my guest houses all windowed as well."

When we climbed out of the cat it was actually pleasantly warm, perhaps twenty degrees, and we just carried our parkas. The bright amber sun, now rolling down toward the mountains west of us, made our Occitan clothes look oddly garish and outlandish; Bruce's simple coverall and shirt had more color and texture than I'd have thought possible.

"Let's all get inside and have a little food and sleep," he said. "I imagine you're tired and we're coming up on Second Dark, when most people sleep, so you can get on the local schedule. Supposedly your baggage won't be along for a Light or two, but I've got spare rooms I use for field hands at harvest, so I made up three of those—uh, unless you'd rather use two." He sounded so embarrassed that I thought it was kind of heartless of Aimeric to wink at me.

"You're very kind," I said, *"Que merce!"*

That seemed to embarrass Bruce even further, and he turned away from me and toward Aimeric, just in time to catch Aimeric reaching into his pocket. "Aw," he said, "now that we're away from the city and the cops your IOU is good enough for me."

I turned away for a moment to look around me. The land I stood in looked more like a vu than like anywhere real. Automatically, I reached for Raimbaut's mind to show him this, and —almost as automatically—I was shredded at the heart by the realization that he was no longer here. It had been the same, over and over, for the past four days, since they had taken him off of me; somehow, though, as I looked at the odd colors and the harsh, scoured mountains, the great open fields and straight-rowed orchards, I knew this would be the last such seizure of memory.

While I looked at my strange surroundings I wondered what Raimbaut might have thought of all of it, and to

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my surprise that made me feel differently, as if the loop of these past few days had suddenly broken; I had known, even before I wore his psypyx, everything he thought about everything one might find in the Quartier des Jovents. But confronted with this . . . I had no idea what he might have felt, thought, or exclaimed.

My thoughts turned again to Garsenda, and I realized that it was much the same for her—as well as I had known her back in the Quartier, I could not now imagine what she would make of this. The same held for Marcabru, and Yseut, and all my other friends. Indeed, I had no idea what Aimeric felt as he saw his home world for the first time in many years, after so long believing it lost to him forever, or what Bieris might be thinking.

And Bruce, of course, was beyond comprehension.

I had lived all my life among the certainty that what passed through my mind would pass through the minds of any of my fellows, were he standing where I was. And it had been true. My wearing of Raimbaut's psypyx had only confirmed what I already knew to be true, that everyone I knew was what I was.

If somehow a springer door back to my own apartment opened in front of me right then, it would make no difference; I could not return at all to what I had been—to the only thing I knew how to be. My mind whirled through the last two days, trying to find the moment when I had crossed over to this new life—

"Hey, Giraut!" Aimeric said. I turned to see him standing in the heatlock of Bruce's house. The others had vanished. "We didn't even notice you hadn't followed us in. You'll freeze solid out here in a couple of hours—why don't you come in?"

I shook my head, once, to clear it. "I was just thinking."

Aimeric came out of the house, closing the outer heatlock door, and approached me as slowly and carefully as if he had thought I might suddenly blow up. "I was afraid you might be," he said. "Did it just hit you that you can't go home?"

"You could say that." He was not standing directly in front of me, and realizing why he had come to me, I asked, "Did you ever feel that way?"

"Often, my first few weeks; off and on since." He sighed. "I wish we'd had a few more hours to talk you out of this. Well, at least it's not quite so permanent—you will be going home in a stan- year or two."

"I'll be going *back*," I corrected him automatically, as I picked up my lute case and followed him into his old friend's house. He turned and looked at me, perhaps trying to think of something to say, but finally said nothing.

The heatlock door closed behind us, the inner door opened, and we went inside. It wasn't until I was almost asleep, in one of Bruce's guest rooms, that I realized *I* had no idea of how I felt either. ■

(Editor's Note: The worlds of this story were discussed earlier in the author's March 1990 "State of the Art" piece, "How to Build a Future.")

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A STORY OF SAINT BRIGIT

Amy Bechtel

Medicine is peculiar stuff: even with advanced methods, the patient has to help. *How* she helps depends on the world she lives in. . . .

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Todd Cameron Hamilton

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Huong O'Brien stepped out of the machine, into the sunlight, and took a great breath of air. It was beautiful ancient air, clear and cold, smelling of grass and trees and wind.

The machine had arrived in a wooded valley, and now sat silent, nearly hidden by sheltering trees. On all sides, green hills rose toward the sky, inviting Huong to climb them, to see what lay beyond. Which way to go? Huong checked her clothing and med bracelet, made sure her pockets were full of things she might trade, and picked a direction at random. As she climbed the hill in the bright sunlight, feeling the wind blow her long black hair away from her face; it was hard for her to remember that this was an assignment: her professor, Nigel Williams, had sent her in search of a sheep. He needed one for his work on extinct species. "It won't be a hard job," he'd said. "I'll send you to a time when there are sheep everywhere. In Northern Britain I think, Scotland or Northumberland; they used to have lovely beasts up there. Mind you, they'll all belong to someone, and you might have to buy instead of take. Just use your best judgment."

It was colder on top of the hill. Huong pulled her coat tight and crossed her arms in front of her. From this vantage point she could see far into the outlying hills; she could just make out the tiny specks of houses in a distant village below, and somewhere in the vast green checkerboard of surrounding fields she was bound to find a sheep. Huong shivered at the thought of bargaining with a shepherd. It was so much easier to go to times and places where no people yet existed.

A cloud passed across the Sun, and the hill went into shadow. Huong set off downhill, in the direction of the village she had seen, fear competing with exhilaration in her mind.

Below in the village, the healer Eveline stood outside the door of Meave's cottage, not wanting to go in. She knew that Meave would be worse. The young woman was on a downward spiral, her cough worsening daily, her strength less, her small frame more and more emaciated. Eveline had already tried every medication, every herb, every charm that she knew, and nothing had worked; there was nothing in the healer's bag she carried that was going to work today.

She looked past the cottage, past the cluster of houses nearby, at the rising hills and the crumbling stones of the wall beyond the village. She had once loved the cold winter wind that came down out of the mountains, had gloried in it, but now all she could think of was how much worse this cold would make Meave.

"Mother? Aren't we going in?"

Eveline looked down; her daughter, Brigit, was gazing up at her curiously, her green eyes bright, her red hair blowing around her face in the wind. Eveline took a deep breath. "In a moment," she said.

Even without Meave's illness to deal with, it would be hard for Eveline to go into this house. Eveline's older daughter Fione had once lived here. And had died here, in Eveline's arms, under her care.

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"Oh, Fione," Eveline whispered. "Forgive me."

She closed her eyes, but knew that Brigit was watching her, watching her with an understanding greater than she should have had at ten years.

Eveline pushed aside the memories, furiously told herself not to cry, and knocked at the door before she could change her mind. The door flew open under her hand, and Galt peered out. He was a big man, handsome, with blond hair and beard. He had married Meave only two months after Fione had died, and within a week he'd been beating her as badly as he had once beaten Fione. Meave had seemed to age ten years overnight, and had slipped into a kind of passive inertia. Perhaps she thought all marriages were like this one. Fione had known better.

"You've done no good, woman," Galt said harshly. "Meave's worse. Have you no skill at all, then? If there were any other healer to call on—"

Eveline moved quietly past Galt, carrying her bag like a shield, making no response to his angry words. Brigit followed her, giving Galt a very wide berth. Eveline sat on the edge of Meave's bed and felt the despair settle back over her. Meave had the look of death upon her; she would not last long now. Nothing Eveline did would make a difference.

"Meave?"

The woman turned, looked at Eveline with dull eyes. Meave had lost weight drastically since Eveline had last seen her. It had only been four days.

"I've brought some more medicine," Eveline said gently. "It might make you feel better."

Brigit carefully measured the dose and gave it to Meave while Eveline whispered a charm, the most powerful charm she knew. For good measure, Eveline said it twice, and Brigit repeated the words along with her. But at the end Meave lay just as quiet and drained, and Galt still stood over her with his arms folded, belligerently waiting for an instant cure.

Eveline drew a deep breath and said to Galt, "Give her this every few hours. It will help with the cough."

"Won't do any good," Galt said. "No better than any of the other stuff you've given her. You're making her worse, woman. She wasn't half so sick when you began to see her."

"I can't cure everything," Eveline said, stung. "No healer can."

"You can't cure anything so far as I can see. Not even your own daughter." Galt glared at her, then stormed out of the house, slamming the door behind him.

Eveline's hands clenched, in anger and frustration, but Meave didn't notice when her husband left; she didn't move, didn't look for him. She had passed the stage of caring about anything. Eveline looked down at Meave, her eyes stinging with tears. Why did Galt upset her so? She had met many like Galt during her life as a healer: some who could not accept that there were diseases no one could cure; others who would wait until their loved ones were near death before bothering to call on a healer. Eveline had always been philosophical about such people.

Not even your own daughter.

Fione had died in childbirth, and the baby had died with her. Eveline had not

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been able to save her. She still felt the helpless despair, the feeling of drowning, that had come over her when Fione had died. It seemed as if there should have been so much more she could do; this was her *daughter;* surely there was some miraculous thing she could pull out of her bag that would save Fione against all odds. But she could do no more than her best, and she gave her best to all her patients. There was nothing more for Fione.

"Don't listen to him, Mother," Brigit said. "He's just mean. You know that."

"Yes. I know."

"You cured *me*."

"Yes." Eveline smiled at Brigit, gently stroked her hair. Not two weeks ago Brigit had fallen ill, with a high fever and swollen glands in her throat. She had been sick for days, and Eveline, treating her, had been terrified. . . . suppose it didn't work? What if she missed something, gave the wrong treatment? What if Brigit grew worse, or died? Every time she had looked at Brigit she had seen Fione, lying dead in her arms.

But Brigit had gotten well.

Eveline got up from the bed. "Goodbye, Meave," she said. "I hope you feel better. I'll be by to see you tomorrow."

"Thank you," Meave whispered. "For trying."

Eveline could see the knowledge of death, the acceptance of it, in Meave's face. She nodded quickly, took Brigit's hand, and fled the house. The bright cold air felt like a dream after the musty, suffocating smell within Meave's cottage. The smell of death, Eveline thought. It had lurked in the cottage ever since Fione's labor had begun.

Brigit had gone very quiet. She must be thinking of her sister, Eveline thought. Beautiful Fione. Eveline wanted to fall apart, to run out on the downs and cry until she had no more tears, but she had work to do, and Brigit to think of. Holding Brigit's hand, she set off across the village to see her next patient. The messenger had said that old Regan Lowery had burned herself while cooking this morning. Regan was a regular patient, accident-prone even around the house. A burn would be easy, Eveline thought; perhaps this next treatment would restore her confidence, her pride. Lifting her head, she marched up to Regan's house and rapped firmly on the door.

There was no response. Frowning, Eveline knocked again, louder, worried that old Regan, widowed years ago and living alone, might be too badly hurt to reach the door. But surely a cooking burn would not be so bad? Eveline had her hand on the latch when the door creaked open and Regan Lowery looked out at her.

"Hello, Regan," Eveline said. "I hear you have a burn that wants treating?"

Regan looked down, not meeting Eveline's eyes. "Not as bad as I thought," she said. "Won't need anything."

"Are you sure? Maybe I should have a look at it."

"No, no. Healed already."

"Regan—"

Regan turned away to swing shut the door, and Eveline caught her breath as she saw the ugly, blistered red burns across Regan's arm.

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"Regan!"

The old woman hesitated, glancing briefly at Eveline's horrified face. "I'll treat them myself," she said. "Galt, he said it was better that way."

The door closed. Eveline was left staring at it in shock, her mouth half open, her hand clenched too tightly on Brigit's. Slowly she loosened her grip on her daughter. News travels fast, she thought. Too fast. What evil tales was Galt spreading about her now?

"Can we go home?" Brigit asked, her voice very small.

"Yes," Eveline whispered. "Yes, it's time." Dazed, she led the way out of the village, to the footpath which led up into the hills where their croft lay. Brigit lagged behind, her eyes downcast, her usual good cheer gone without a trace. Eveline wished mightily that she had not taken Brigit to town with her today. If only she had sent the child up into the hills to help her father, Donal, gather the sheep. If only.

Black clouds were now gathering, ominous on the horizon. It would have been better, Eveline thought, if she had not gotten out of bed this morning. Nothing had gone right this day. She thought of the croft, of the warm fire they would have tonight, sheltered from the wind, of the bed where she would rest her aching body and be soothed by Donal's touch. Eveline's pace quickened, but Brigit lagged farther behind.

"Brigit!" she called. "Hurry, there's a storm coming. We have to get home."

There was no response, no reply. Eveline stopped and waited as Brigit trudged toward her, head bowed. The winds rose, whistling through the small pines near the footpath.

When Brigit finally reached her, Eveline took her daughter's hand.

"What is it?" she said.

"I'm just tired," Brigit said. "I don't know why."

Eveline gazed at her, worried. "Maybe you haven't got all your strength back yet, since you've been sick." She reached out, smoothed back Brigit's red hair, and touched her cheek and forehead. The child's face was hot and damp.

A soundless cry built within Eveline; her ears rang with it, but she kept her face and voice calm and steady as she looked down at Brigit.

"You're running a bit of a fever again," she said. "I guess you've done too much today. Tomorrow you'll stay home and rest."

"But I was to help Father with the sheep tomorrow."

"He'll just have to manage alone then. Because you'll be staying in bed."

Eveline expected more argument, but Brigit nodded quietly, too quietly, and trudged slowly all the way back to the croft. As Eveline walked with her, looking down at her daughter with growing panic, the winds rose still higher, bringing the clouds overhead very fast, and thunder rumbled in the hills.

The door blew shut behind them with a hard *slam*. Eveline put down her bag and found that she was shaking; the house was cold and empty. Donal must still be out with the sheep; he'd be trying to get them all in before the storm broke. The storm. It was so unexpected; there'd been no signs or warnings.

Brigit changed into her night clothes slowly, stiffly, as if every movement brought pain, and Eveline's hands trem-

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bled as she lit a fire in the hearth and put a kettle on to boil. As soon as the house began to warm, she sat at the edge of Brigit's bed and carefully examined her daughter. The swollen glands at Brigit's throat had not recurred, but her fever was already higher than it had been before, and there seemed to be pain in the joints, pain with every movement.

"I'll get you something for the fever," Eveline said. "It'll help with the pain as well."

Brigit nodded, and Eveline flinched away from the trust in her daughter's eyes. She prepared a dose for Brigit, knowing that it would not be enough to deal with the pain that would follow. The only mercy was that Brigit had not seen this disease before and would not recognize her own symptoms. But Eveline knew them all too well.

She had seen this before. The gland swelling was a common ailment of children, easy enough to treat, an illness that the body would usually recover from even without help. But some children, after appearing to get well, would come down with something else, a malady that must be related to the initial disease in some way though Eveline had never figured out how. A week or two after the first episode of illness, those children would lapse into terrible symptoms of fever and painful swollen joints. Of all the children Eveline had seen with this second disease, half had died.

Eveline remembered how she had talked to the parents of such children, how she had tried to encourage them by telling them that there was a decent chance of eventual recovery. Compared to many childhood diseases, the odds were good, and as a healer dealing with such cases she had always felt optimistic.

It was so very different now.

The storm came down from the mountains without warning, moving faster than Donal had ever seen a storm move, and here it was lambing time, the very worst time for the beasts to be chill and wet. Donal yelled to his dog and it took off at a flat run, circling the flock, barking like mad and nipping the heels of the ewes. Good thing Brigit went to town with her mother today, Donal thought, with weather like this in store. The flock caught scent of the rain and lightning and moved downhill at a frightened run, hardly needing to be goaded by the dog. Donal took up his staff and hurried after.

At the ford halfway home the flock suddenly changed course, circling nervously rather than going straight on, and Donal heard his dog's sharp warning bark. Donal pushed through the milling beasts, staff in hand. If the creek had already risen too high for a crossing . . . but it hadn't, it chuckled and muttered in its bed as it always had. The dog was barking at a girl who was standing in the road.

"Fione—"

For an instant Donal thought it *was* her, impossibly Fione, windblown hair falling to her waist and wide blue eyes, but then the girl smiled and all resemblance to Fione vanished. Donal blinked and swallowed, trying to clear his head. Thunder rumbled in the distance and the dog growled low in its throat; Donal looked down at the dog, startled.

"Hush now," he said to the dog, and to the girl, "Good day."

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"Hello," she said. "I wonder if you can help me."

"Help you?"

"Yes. I'm looking to buy a sheep."

"A sheep," Donal said, looking bemusedly at his milling beasts, and then past them at the cold and empty tors and crags, the chill muttering creek, the lightning-filled clouds hovering ever closer. He said, "It's a strange place to come buying, up here."

"It's just that I've come a long way," she said.

A long way to buy a sheep? There were sheep everywhere. The girl said, as if attempting to explain, "It's a very particular sort of sheep I'm looking for."

"Well then I don't know if I can help you." Was it his imagination, or did the creek sound louder? Was it running higher in its banks, deepening with the rainwater falling even now in the high mountains? "I only have the ordinary sort, nothing but rough wool; I don't think you'd be interested."

"Oh, but these would do nicely," she said.

A drop of rain struck Donal on the hand and he heard more drops pattering around him, dampening the wool on the backs of the sheep, disappearing into the rushing of the creek. It *was* running higher.

"No time now," Donal said. He had to speak to the dog twice before he got its attention, and even then it moved sullenly, looking over its shoulder at the girl and flattening its ears. Lightning flashed close, striking a nearby hillside, and the sheep hit the water at a run, with frightened splashes and bleats.

"Please," the girl said. "It will only take a moment."

"I haven't got a moment," Donal said, "but you're welcome to come with me; you'll be wanting shelter I expect."

"Oh no, I don't need—" Another jagged streak of lightning touched earth, closer this time, and the girl's face changed; she said, "I mean, thank you. I'll be glad to come."

Eveline pored over an old book, a book which she had gotten from the healer who had taught her the craft. She turned the pages slowly, curling them in her fingers, looking for something new even though she had memorized all the pages long ago. If she looked hard enough, perhaps she would find another way to treat this illness, another herb, another charm, something she had never tried before. She glanced up from the book and looked at Brigit, who lay in a restless half sleep, her face damp with sweat from the fever.

The door of the house flew open with a crash, and Eveline whirled, startled. The candles at her table guttered and went out, and the book was spotted with raindrops. Galt stood in the doorway, hands clenched, the storm at his back.

"She's dead," Galt said. "Meave's dead, and you killed her. Killed her with your charms and your drugs."

Eveline slowly rose to her feet, holding her book close to her breast, and moved between Galt and Brigit. Whatever happened, Galt must not come near Brigit. Whatever happened.

Eveline said, "I'm sorry. I did my best to save her."

"You *killed* her! Killed her! You're

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only a butcher. Shouldn't be allowed near anyone ill. Shouldn't—"

Something flew across the room—a stick of firewood, Eveline realized dazedly—and struck Galt full in the chest. Brigit had thrown it. She had crawled out of bed and had hurled the first weapon she'd found.

"Get out!" Brigit cried. "You leave my mother alone!"

Brigit grabbed another piece of wood and stood clutching it, ready to throw, small and weak but full of fiery anger. Galt took a step back and glanced over his shoulder.

Eveline heard the clatter of hooves, the barking of the dog. Donal had come home. "You'll leave now," she said to Galt, keeping her voice calm and low. "*You'll trouble us no more.*'

Galt hesitated for a moment, glaring from Eveline to Brigit, then said to Eveline, "May they all die under your hands. Like Meave." Then he was gone.

Eveline shut the door on him, closing out the storm as well, and rushed to help Brigit back into bed. "Well done, love," she whispered. "You sent him off, right enough." She smoothed her daughter's hair on the pillow, touched her brow, then jerked her hand back with a shock, remembering Galt's words. He had cursed her. . . . May they all die under your hands, he'd said. Suppose he had the power to make such a curse real? She closed her eyes, trying to remember wards she had learned long ago, charms against curses, and was reciting them as best she could remember when the door opened again, more gently this time, and she turned to find her husband and a stranger at the door.

Donal was soaked, dripping rainwater all over the floor. "Eveline," he said. "Didn't quite beat the storm, I guess. Did I see someone leaving here, in this?"

Eveline nodded. "It was Galt."

"*Galt?* What was he doing here?"

"Meave just died. He was angry with me."

"What did he do here?"

"Nothing. He left."

"He didn't hurt you?"

"He only shouted. Donal, leave it. Brigit already hit him with a stick of firewood."

"*Did* she?" Donal smiled, then sighed. "Poor Meave. I wonder what unlucky girl Galt will choose for his next wife." Donal pulled off his sopping coat and moved closer to the fire. Behind him a girl stepped hesitantly forward and Eveline almost called out *Fione* . . . she was just the right age, long black hair wet with the rain, eyes vivid blue . . . but she was not Fione. Eveline sat back, breathing hard, trying to calm herself. Not Fione. She was only a traveler Donal had brought home to shelter from the storm.

"Eveline," Donal said, "this is Huong O'Brien, come to buy some sheep. She'll need shelter for the night."

"Of course," Eveline said, staring at Huong. The girl greeted her shyly, then moved to the fire, holding out her hands to it. She seemed, Eveline thought, uncommonly young and lovely to be out on the downs buying sheep.

Donal hung his wet outer clothing, and Huong's, near the fire. "Brigit's abed so soon?" he said, surprised.

"Yes." Eveline looked down. "She's sick."

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"Sick! But she just got well, not two weeks ago. How can she be sick again?"

"She is."

"Is it as bad as last time?"

"I don't know yet," Eveline said. She felt ashamed, concealing what she knew from Donal, but Donal's feelings were always out in the open, and he could keep no secret. If he were afraid, that fear would touch Brigit, and she could not let that happen. Donal gazed at Eveline for a moment, as if he suspected she was not telling the truth, but then he smiled at her with utter confidence.

"Well, you'll take care of it," he said. "What a blessing to have a healer right here, in the family."

His sincerity appalled Eveline; she almost blurted out what Brigit's odds for survival really were. Instead she mechanically greeted the lovely young visitor, made her welcome, and prepared food, trying all the time not to compare this quiet, awkward girl with the absent Fione. As soon as the meal was done, Eveline returned to her books. She lit the candles, blotted away the rain spots, found her place, and began to read again.

Donal went to Brigit's bed, sat beside her. "Brigit, love," he said. "How're you feeling?"

"Awful," she whispered. "But I made Galt leave."

"So your mother said, a brave girl you are."

A foolish girl, Eveline thought. But not nearly so foolish as Fione, who had submitted to Galt, and died for it. Brigit's fire and spirit might help her drive off this illness.

Donal began to tell a Brigit a story, an old Irish tale he had brought from his homeland, about a prince and a princess and a peculiar magical horse. Eveline's vision blurred; she was having trouble reading the words in her book. She glanced up, rubbed her eyes, and noticed that the visitor, Huong, was standing tentatively near the fire, as if not certain where she should go.

"Come, girl," Eveline said. "Sit down, rest yourself."

Huong hesitantly sat at the table beside her, but the girl's eyes were on Donal, her attention on his story. When the story was done, the prince and princess ready to live happily ever after, Huong said softly, "Your husband tells a wonderful story."

"Aye, he has the gift of storytelling," Eveline said. "He might be a bard, if anyone could ever pry him away from his flock. He had these stories from his father, back in Ireland."

"Would you like something to eat now?" Donal said, to Brigit.

"No," Brigit said.

"To drink then?"

"No."

"You must want something."

"Another story," Brigit whispered.

Donal smiled, and took her hand in his. "A story you'll have, then," he said. "One you haven't heard before. It's the story of Saint Brigit. Her name was the same as yours: Brigit. She was a good woman, and she lived such a long and generous life that everyone knew she had become a saint. After she died, a white fish appeared in her well, a white fish with three orange spots on each side. One day a girl went out to the well for water, and when she drew up the bucket the fish was in it. Now,

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this girl had clouding of the eyes, and could hardly see—she could make out nothing but blurs of light and dark—but when she looked at the fish her vision cleared instantly, and she heard Saint Brigit speak to her, telling her that she had been cured."

Brigit's face was rapt, her eyes gazing at something faraway, and she listened to the final words of the story.

"She appears only rarely," Donal said, "in a well, in a stream . . . only to those she chooses, only to those who are most worthy in her eyes."

Brigit nodded painfully, and clutched her father's hand, very tight. "She'll come to me," Brigit said, low. "Won't she?"

And Eveline began to cry, because of everything, because if she had trusted Donal with the truth about their child's illness he would never have told the story of Saint Brigit, and now Brigit had heard it, and it was too late.

Huong slept fitfully, wrapped in a blanket on the floor by the smoldering fire, dreaming that she was stranded far from the machine, that she could not get back. She woke to find reality too near the dream for comfort; the machine seemed terribly far away now, a lifetime away. What had possessed her to venture so far into this time? Perhaps she should have gone back empty-handed, tried again some other time. But there was that story, the one the students whispered among themselves, about the girl who had recklessly used the machine during an electrical storm in the fifth century, and what had happened to her. But oh, that couldn't *all* be true. . . . could it? In any event Huong thought she was safer here, even in this distant time with illness in the house; the med bracelet she wore on her wrist would protect her from disease. Logs settled in the fire and sparks jumped; the room smelled of fire and smoke, wet wool, and sheep droppings. Smells from the past.

A fresh breeze suddenly rushed into the house, with the scent of rain and stars, and Huong heard the faint, whispering creak of the door. She rolled over, blinking back sleep, and saw little Brigit, red hair streaming, disappear across the threshhold like a ghost. The door silently shut behind the child, and Huong wondered if she was still dreaming. With an effort she sat up to look at Brigit's bed. It was empty.

Huong pushed off her blanket, got to her feet, and stood very still for a moment, considering. She knew she should not get involved. The child had nothing to do with her. But Huong found herself rising to her feet, moving silently to the door. Carefully she opened the door, trying not to let it creak, and looked out. The moon was full, shining through a gap in the heavy clouds, and in the distance the hills were silver. Lightning still flashed over the mountains, and thunder growled low, but the rain had stopped. Huong folded her arms, shivering, and moved out into the muddy yard. In the pens she heard the muted sounds of sheep milling about, soft bleats, the clatter of hooves on wood slats. By the well, she saw a small dark shadow struggling to pull on the rope. Huong walked slowly to the well, and found Brigit there.

"Brigit?" she said. "What are you doing?"

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"Bringing the bucket," Brigit said. "I have to bring up the bucket, because the fish will be there; I know it will. Saint Brigit, she'll come for me."

"But that's only a story," Huong said.

"No," Brigit said; determined, she took a firmer grip on the rope and tried to pull. Huong gently took the rope from her and raised the bucket herself. Carefully she grasped the handle and lifted the bucket clear of the well. The cold water sloshed over the side, chilling her fingers; the full Moon shone bright on the surface of the water. Brigit drew closer, using all of her strength to peer into the bucket. Slowly the ripples died away, and Brigit and Huong both looked into the depths. There was no fish there.

"No," Brigit whispered. "She has to be there. She has to be."

"Brigit, I'm sorry. But you don't need the fish, do you? Your mother is a healer. She'll take care of you."

"She can't."

"Why not?"

"It was Galt. He cursed her. He said I would die under her hands."

"Brigit, you can't believe—"

"That I'd die," Brigit said. Slowly she lay down by the well, in the cold mud, and closed her eyes. The Moon slipped behind the clouds and the surrounding hills turned from silver to black. Huong could see the child only as a dark shape, a shadow in the night. Fumbling, Huong reached out to take Brigit's cold hand.

"Brigit."

There was no response.

"Brigit, please. Please." Brigit's hand seemed to grow colder, and a dreary drizzle began to fall from the sky. Huong felt tears coming to her eyes. Her hand went to her own wrist, found the med bracelet there. She tried to pull her hand away from it. This had nothing to do with her; this was only a child who had died, and had been forgotten, centuries ago. "Too much interference could cause problems," Nigel had told Huong, before her first trip. "And we might have to shut down. You could get stranded back there. So keep your mind on what you're after." She had asked him how much interference was too much, and he had shrugged, and answered that no one really knew. She would have to use her best judgment.

Huong carefully took the bracelet off her wrist and fastened it onto Brigit's, tightening it until it fit, then activated it. She lifted Brigit in her arms and carried her back into the house, shutting the door with her foot. She put the child to bed, pulling the blankets over her, and said, very low, "You'll be all right now, Brigit. You'll be all right." The bracelet quietly signaled that it had finished its work. Huong took it off Brigit's wrist and fastened it back on her own. She sat by the bed a moment longer, gently smoothing Brigit's hair, and then returned to her blanket by the fire.

Huong did not sleep for the rest of that night. Some time later she heard Eveline get up and move about the house, lighting a candle by the bed, mixing some sort of medication, talking to Brigit in low tones. "Here, love, take this. It will help." Huong opened her eyes, looking and listening, but didn't hear any reply from Brigit. Instead, she heard Eveline begin to cry. A few min-

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utes later Eveline whispered, "Dear God, I am cursed. I can do nothing. My child will die." Her slow steps returned to her bed, where she lay crying softly for a long time. When all was still again, Huong slipped back to Brigit's side. Why was Eveline in such despair? The med bracelet had done its work; Brigit should be getting better fast. An improvement should already be apparent.

Eveline had left a candle burning near Brigit's bed, and Huong entered the soft circle of light, touched the child's face. Brigit moaned in her sleep as if that gentle touch was too much for her to bear, and her face was hot and damp. She was still feverish, still terribly ill. Still dying.

Huong took off her bracelet again and looked at it in bewilderment. There was nothing wrong with it. It should have worked on the child. The fever, the aches and pains, all were symptoms of a simple bacterial infection, something which should be no challenge at all for the med bracelet. Why hadn't it worked?

She stared at the flame of the candle, her mind blank, until orange spots appeared before her eyes and she blinked and looked back at Brigit. The orange spots were still hovering in front of her eyes. Three spots. Three orange spots on either side of a white fish who had once been a blessed saint.

Huong touched Brigit's hair, very lightly, then moved away, to the door. She slipped outside. It was colder than ever but the clouds were clearing, and a few stars were shining through. It would be dawn soon. Huong crossed the yard, splashing through deep puddles, and entered the sheep sheds. The dog, who lay curled on a bit of straw, lifted its head and glared at her, ears flattened, but did not bark. The sheep stirred and bleated. It was warm in the shed, heavy with the thick smell of sheep and wood and fresh rain. Huong walked among the sheep, putting her hands on them and examining them, trying to think only of the reason she had come here. She had come for a sheep, a very specific sort of sheep, one just like this. Nigel needed such a sheep. This lamb, for instance; he would love this one. Huong picked it up and held it, burying her nose in its wool. It had a slender black face and black legs and long ragged cream-colored wool, tangled and dirty. It was marked, like the rest of the flock, with a splotch of orange across its back. To identify it as one of Donal's flock, Huong supposed. Nigel had told her that shepherds had once used colors to mark their beasts.

Orange. Huong wondered if white fish with orange spots existed anywhere in this time, if they could be found. Brigit believed strongly in the healing power of that fish; perhaps if she saw it she would indeed recover. Most professors would credit such a recovery to a change in the chemical matrix of the brain; Nigel would call it, more simply, the power of belief.

Huong wished she could ask Nigel why the bracelet hadn't worked on Brigit. She tried to imagine what he would tell her. "The child has no faith in a bracelet," he would say. "She believes only in the fish. The body cannot heal without the cooperation of the mind. The child cannot heal without the fish."

Or, more likely, he would simply tell her that the past was past, and had nothing to do with her. She was only to bring back a sheep.

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Huong sighed and put down the sheep she was holding. She put her hands in her pockets and took out the bits of jewelry and charms she carried, hoping they would be adequate trade for a sheep. If she could cure the child, now *that* would be payment enough, and more. If only she could go back to her own time, and return with an orange-spotted fish. It wouldn't be hard to find one there. But she would never be able to bring it back to Brigit; once she left this time there was no returning. Why couldn't Brigit believe in something more easily obtainable than an exotically marked fish?

"But it's not just the fish," Huong said suddenly, to the lamb. "It's Saint Brigit she believes in." The lamb rolled its eyes at her, bewildered, and Huong whirled and ran out of the shed, pushing frightened sheep out of her way.

The house was dark and silent when she entered. The candle by Brigit's bed was flickering and burning low. "Brigit," Huong whispered, shaking the child gently. "Brigit, listen to me. Can you hear me?"

Brigit's eyes flickered open, and Huong said, her voice very soft, directed only to Brigit. "It's part of the same story your father told you, about Saint Brigit. Sometimes she appears as a fish, a white fish with orange spots. But sometimes, when she especially wants to heal someone, she appears in her own form. She's a girl with long black hair and blue eyes, and she wears a bracelet, a magical bracelet. . . ."

When Eveline woke she was afraid to go to Brigit's bed. Some part of her knew the child would be dead. She sat up and put her head in her hands. The fear clenched her, made her powerless to move. Finally she managed to get up, to move woodenly across the room. She knelt by Brigit's bed and, not daring to look, touched her hand.

The hand was warm, and moved when she touched it, moved to clasp her own. Eveline looked up in astonishment. Brigit's eyes were open, and the child was looking at her, with recognition. "Brigit," Eveline said, "Love, how do you feel?"

"Better," Brigit whispered. "Lots better."

The child's fever was down, her body temperature was near normal, her color was better, she was stronger. "Oh, love, you're getting well," Eveline said, and hugged her. "I'm not cursed after all! I can still heal. It worked, it worked." And Eveline cried now with joy, and relief.

Huong shifted the lamb in her arms and headed downhill, toward the creek. She was nearly halfway back to the machine, she had a sheep for Nigel, and her pockets were empty. She glanced down at her bracelet and smiled with pleasure.

The creek was deeper than it had been yesterday, full of rainwater, and it ran high and loud in its banks. Carefully Huong edged into the water, holding the lamb high, and began to cross the ford. The cold water numbed her legs and feet, and the current was strong, but she made it easily to the other side, and hurried on into the hills, heading for the machine, and home.

Her passage disturbed a white fish with orange spots, which moved in circles till the silt and mud drifted back to the bottom of the creek, and then swam on. ■

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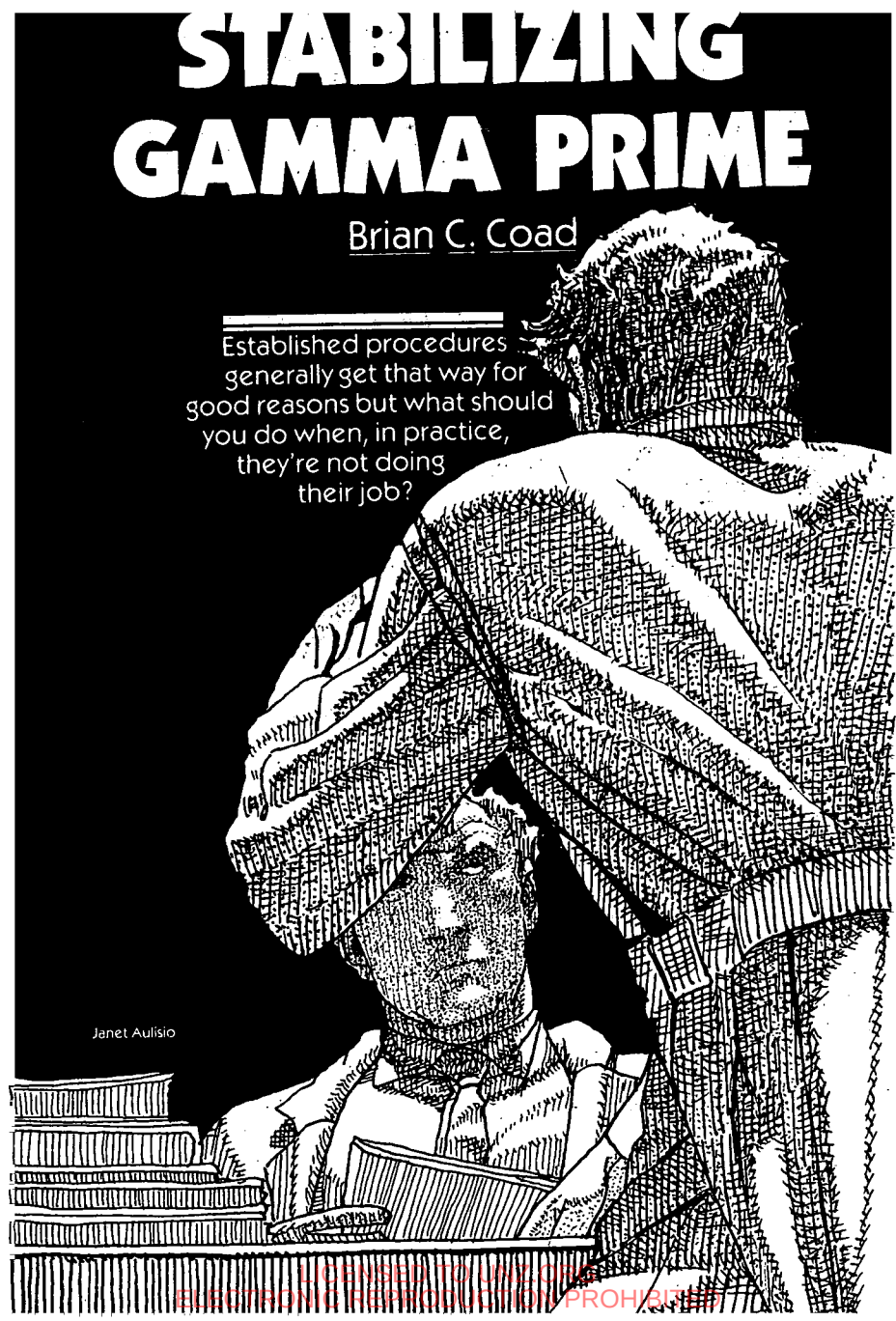
STABILIZING GAMMA PRIME

Brian C. Coad

Established procedures generally get that way for good reasons but what should you do when, in practice, they're not doing their job?



Janet Aulisio

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A bit over a year ago, about ten A.M. on the twenty-first of June, a Geary Twinjet commuter/executive aircraft, one of several hundred flying worldwide, took off from San Francisco International and flew northwest on the first leg of its journey to Los Angeles. It belonged to the ACG Corporation, an oil country goods manufacturer. Twinjets can accommodate up to twelve passengers. This one, besides the crew of three, had aboard three ACG executives, one Arab prince from Saudi Arabia, three of the prince's wives, and a Pomeranian dog named Caleb, the pedigreed pet of one of the wives.

Shortly after the aircraft, climbing towards cruising altitude, turned left over Daly City to pick up the standard flight path to L.A., it disappeared from radar, and was subsequently found to have crashed into the Pacific Ocean a hundred yards off the narrow beach in the little cove of Pacifica. Luckily, although the sky was clouded over with what they call locally "high fog," the sea was calm, with none of the great rollers beloved of surfers streaming in to crash upon the beach. Nonetheless, there were a few surfers out, bobbing up and down in their rubber suits like lazy seals.

Twinjets are rugged aircraft, the unscheduled sea landing caused little structural damage. The airplane floated long enough for the surfers to flail their way up to it through the waves. Exercising the skills of their hobby, they managed, on their boards, to float all passengers and crew safely ashore. No one was injured. Only Caleb, the Pomeranian, too excited to be confined to a rescuer's board, leapt snarling and barking hysterically into the gently swelling waves and was lost. Of the demise of the unfortunate dog and the agonized grief of its mistress, the media made much, it being the slack time of summer.

From the *Times*—or perhaps from an evening news broadcast—I learned of the crash, felt mildly pleased that the people were saved, shed a ten-second tear for the dog, and thought no more about the incident. Certainly it didn't occur to me that my employers, General Business, Inc., would have any part in the affair. Even if it had occurred to me, I'd have had only cursory interest. The corporate patent attorney is pretty well insulated from such worldly things as airplane crashes.

For more than a year, no thought of the accident entered my head.

Day before yesterday (it's late September), Tommy Smith, our corporate general counsel, entered my office, a sheaf of papers under his arm. "Here's trouble, Wally." He plonked the papers down on my desk. "You remember that Geary Twinjet that crashed on the West Coast a year or so ago?"

"Vaguely." It was a struggle to recall what I knew about it.

"Its engines were built by Corvo Corporation—Corvo Air Squeezers, Mark Ten, I believe they're called. Some of the parts were supplied by G.B.I. Aerocomponents Division. Made of an alloy cast to Corvo specs., trademark Supercorvolite."

"So?"

"So Corvo Corp.'s claiming the plane

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fell out of the sky because we supplied defective components. They're suing our ass off, not to mention the other host of plaintiffs, the owners of the aircraft, the passengers, their uncles and aunts, and half the people in Saudi Arabia."

"What'd you want me to do about it? Something like that sounds like its outside my range of competence."

"You understand jet engines. The technology. I'd like you to review the information—the National Transportation Safety Board's accident report in particular—maybe go to Houston, interview some of the people concerned —see if you can come up with some technical facts that'll help with our defense."

"Sure. I'll do that."

"I can only give you a week or so. Is that long enough?"

"I'll do my best."

He left my office. I pulled the papers he'd provided towards me.

Topmost was the N.T.S.B. report, which immediately had me reading. I like N.T.S.B. accident reports. They're the closest thing technical writings can be to good detective thrillers—dramatic, suspenseful, logical, concise, and well-written. The total report, including appendices, ran over twenty pages. I'll summarize it here. If you want more detail, I can send you the reference. You can order your own copy.

The report began, as they always do, with background information—the aircraft's serial number (N 10247) and those of the engines (CGB 258976 and 258834—referred to subsequently as engines A and B respectively), their maintenance record (up to date, and satisfactory)—qualifications of the three person crew (captain, second pilot, cabin attendant), their medical boards (also up to date and satisfactory)—airport conditions (visibility twenty miles with coastal high fog, wind five m.p.h. from the southwest)—runway 24—aircraft loading (including fuel, well within specified limits)—and so forth.

The Twinjet was airborne at precisely 10:11 A.M. on that morning of its misfortune. Three minutes later, over Daly City, control was passed from SFO to Monterey. The aircraft was at 2,500 feet, 250 knots, and climbing through light haze, the upper layers of the high fog along the shore line. Because of moderate turbulence associated with the fog, the captain had left on the "Fasten Seat Belts" sign. At 10:15 and 32 seconds, the aircraft's flight recorder, which was recovered after the accident, registered a sudden severe deceleration, and sharp leftward banking. On the cockpit voice recorder, the captain's voice: "What in hell was that?" Second pilot: "Christ knows. Port engine's gone kaput. Something hit it?" Captain: "There, there, baby. OK I've got her. Better turn back. Call SFO. Oh, shit!"

At that point, the flight recorder showed a second severe deceleration, this time with a bank to right. Further remarks on the voice recorder (expletives deleted in the report) indicated that both engines were then out of action, and provided a running commentary on the captain's successful attempt to deadstick down through the fog layer to a reasonable ditching in the ocean, 110 yards from shore, where the high fog ceiling was 100 feet.

The report outlined rescue operations—actions of the surf board frater-

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nity, etc.—then got down to the nitty gritty. The aircraft was recovered intact, and transported to the Board's crash assembly hanger at Moffatt Field, Palo Alto. There was minimal structural damage to the airframe, with no indication that airframe failure had any part in the accident. Attention was therefore concentrated on the engines. I won't go into the messy details of what was found ingested in the engines, but there was a whole lot of organic matter, feathers, blood and guts, which was identified as bird body debris, and was subsequently further categorized by an expert as pelican debris. The same expert stated that though pelicans normally fly near sea level, they have been seen at altitudes to ten thousand feet, and though they normally fly in groups of three or four, they may migrate northwards in substantial flocks during the summer season.

Thus the investigators, not having had to exercise major deductive skills in this instance, concluded that the Twinjet was victim of pelican ingestion as a result of a rare, but not unknown, aberration of pelican behavior. Captain and crew were fully exonerated of blame, and congratulated on their professional handling of the incident.

Now we come to the part of significance to G.B.I. The N.T.S.B. is nothing if not thorough in its investigations. After every accident, as a routine, their experts focus attention with microscopic intensity on the materials of which the aircraft—particularly its engines—is constructed. Praise be, there's nothing sloppy about aircraft construction in the United States. Every component that goes into every plane gathers a history as it's fabricated, is fully traceable all the way back to the original metal sources, and is accepted by the aircraft manufacturer only if it is accompanied by a thick volume of certifications, signed by authorized and responsible people, that it meets every relevant specification. There's a saying that no component is allowed to fly unless the weight of its paperwork exceeds its own.The N.T.S.B. people worked their way through the thousands of pages relating to the crashed Twinjet, and could find no fault. They paid particular attention to the tests Corvo performed on its Air Squeezer Mark Ten engines, especially the chicken gun test, where standard three–pound chickens are shot into an engine operating at its maximum designed rating. They concluded that, at least in theory, an Air Squeezer should probably be marginally able to digest a ten-pound pelican, suffering no more inconvenience than a loud burp.

Clearly that hadn't happened, so they went on to a detailed chemical analysis of the crashed engine materials. Here's where we came in. They found that the jet blade alloys of both engines, certified by Peter Mays, president of G.B.I. Aerocomponents to meet the Corvo Corporation Specification 292 for Supercorvolite, met the specification in all respects but one. They contained about 1 percent of hafnium, a rare metal not mentioned in the spec. The hafnium should not have been there.

Further documents certified to the heat-treatments and physical tests performed on the blades by G.B.I. before shipment, in accordance with Corvo Spec. 979A. Results were within specified limits. N.T.S.B. laboratories, tak-

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ing samples from the engines under investigation, repeated the physical tests, and confirmed the results reported were correct.

The hafnium alone, then, was the essence of G.B.I.'s and Tommy Smith's problem. That the engines had succumbed to pelican ingestion was unarguable. No one would suggest that G.B.I. has control of this world's pelicans. Tommy could argue readily enough in court around the extrapolation from chicken to the larger birds. What he could not get around, was the final statement of the report: "While it cannot be stated with certainty that the presence of the non-specified element, hafnium, in the Supercorvolite blades supplied by G.B.I. was contributory to the accident, it cannot be stated definitely that it was not."

From that indeterminate conclusion a deluge of lawsuits has flooded G.B.I., the principle of which, according to the summary Tommy included with the documents he'd left with me, were, alleging G.B.I. malfeasance, a suit filed by ACG Corporation demanding:

1. Four million dollars to pay for the lost aircraft.
2. Three million to compensate for inconvenience to the ACG executives aboard the plane.
3. (Co-plaintiffs with the Arab prince), five million for inconvenience to said prince, one hundred thousand for inconvenience to each of his three wives, and, for loss of Pomeranian Caleb (special dog!), four million dollars . . .

and one filed by CORVO Corporation demanding:

1. All of the above, plus such punitive damages as the court might deem fair, and all legal costs.
2. Five hundred million to compensate for damage done, through G.B.I.'s malfeasance, to their hitherto pristine reputation as an aircraft engine manufacturer.

It was, for sure, no trivial problem we had to face.

When I'd absorbed the material facts of the case from the documents, I called Tommy Smith to tell him I'd booked a reservation on the first flight to Houston next morning. "I want to get to the bottom of this hafnium thing," I told him. "How did it get there, and why? That's at the heart of the problem." What I didn't say was what I felt—that there were hidden complexities here, going far beyond the hafnium additions. Tommy told me I was a sharp one to define the problem so quickly, and thanked me for my sense of urgency. I thanked him, and hung up.

I sat back in my chair and gazed through my office window, high in the corporate tower, at the Connecticut woods, just beginning to blush in autumn glory. What to do next? Should I call the Aerocomponents President, Peter Mays, to warn him I was coming? Or should I just burst in cold? I reviewed in my mind what I knew of the man, who, when all was said and done, bore ultimate responsibility for our predicament. If you're to extricate yourself from a hole like this one, you always have to take a hard look at the individual(s) who dropped you in it. At least, that's been my experience.

Mays, I reflected, was one of those fast-track fellows. Not yet forty, he'd

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held his current high office for three or four years. I knew him to be sharp of mind and features, slim, energetic, dedicated (though, in the pattern of the times, probably more dedicated to his own interests than to the Corporation's). He'd come up sales-wise and had something of a gambler's reputation, but luckily for him the risks he'd taken for the improvement of his division and his status had so far paid off. Although I'd had little opportunity to observe him in action, I felt he was of the type vulnerable to that common contemporary hazard that I call Executive's Trap, of which more hereafter. In general, my feelings toward him were pretty neutral. I had the same sympathy for him that I have for all the divisional presidents on whom the Corporation relies for the performance of their difficult and unenviable task. Nothing more.

The life of every divisional president—Mays included—is controlled by his Annual Plan, a sacred paper he submits to corporate each October. The Plan tabulates with a precision I've never felt warranted the quantities of cash and profits he's going to remit to corporate month by month through the next year. Most presidents submit conservative forecasts, which they defend against corporate challengers. Mays's plans, as I recalled, were never conservative. After considerable negotiation, in early December, the Plans become Budgets, cast in concrete for the following year. From there on, the president is on his own, almost completely autonomous and unsupervised. He's left to sink or swim on the basis of his monthly figures, with the understanding that a negative deviation in any single month could prove disastrous for him. Mays, clearly, with his bullish forecasts, was an ambitious gambler who displayed considerable courage. But he'd always fulfilled his promises. If he'd ever failed, I'd have heard about it soon enough on the corporate grapevine.

People like Mays, I reflected, all too readily fall into the Executive's Trap. They enjoy a high income. Their personal credit is unimpeachable. They can and do borrow enormously, play the stock market or whatever. If they're lucky, they'll achieve both wealth and honor by their early forties. Yet theirs is a house of cards. One month's failure to meet budget, one corporate black mark against them, and they can be deprived of their year's bonus, become unable to cope with their over-extension, and come crashing down. Executive's Trap has sprung.

Could Peter Mays, I wondered, be one of those trapped men? If so, would his condition have any relevance to the problem before me? Should I investigate? Should I, it being a non-technical matter, and therefore outside my terms of reference, leave it alone? Ah, me! Decisions, decisions!

I hadn't even decided yet whether or not to call Mays to tell him I was coming to visit him.

After a bit more thinking time, during which late afternoon shadows spread over the forest below me, I decided I wouldn't call Mays. I'd call Sal Jordan, an engineer at Aerocomponents, with whom I've had considerable patent dealings over the years. I'd put to him subtle leading questions, and generally discover the lie of the land. He might even

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know something himself concerning the hafnium business. My sharp legal mind congratulated itself on its shrewdness. I reached for the telephone.

"Hi, Wally," Sal said, when I'd greeted him. "I'd guess you're calling about the hafnium problem in the Supercovrolite. It's got our honored president doing flame-outs all over. When're you going to come and visit, straighten us out?"

Thus was my clever plan demolished! I had no room whatsoever for subtle questions. The only course open to me was the straightforward one. "I'll be in Houston tomorrow. Don't expect too much of me. I haven't any magic. If Mays is in such a frazzle, I guess we better let him know I'm coming. You want to tell him? Or should I call him separately?"

"It's best you call him."

Which I did, and heard no welcoming hurrahs over the telephone.

My flight to Houston was uneventful. The air conditioner was on the fritz in the car I rented to drive over to Aerocomponents. Houston was enjoying its usual hurricane season weather—temperature and humidity both in the nineties—air smelling moldy, sour, as if it's just crept in from a swamp—menacing black thunderclouds towering over the city like ogres bent on destruction. By the time I reached Mays's office, I was sweaty, sticky, nerve-rasped, and out of breath. The good thing that happened then was that his secretary told me I was expected. The bad thing was that she told me he'd appreciate it if I'd take a seat in her area for a few minutes while he finished up whatever it was he was doing.

I took the indicated seat. From the Aerocomponents office tower, I could observe the grim thunderheads in detail, savor their threat more intimately. It would have made more sense to observe Peter's secretary, a pretty young redhead, fashionable in a brown leather miniskirt. But I'm too serious and too mature to waste time leering at young women. Besides, as objects for observation, thunderheads are safer.

Mays kept me waiting long enough for the cool treated air of the building to chill somewhere close to freezing the puddles of perspiration under my clothes. Eventually a buzzer buzzed on the secretary's desk. She smiled graciously. "You may go in now."

I regret having to record this. I scowled at her.

I found Mays, who'd normally be bright-eyed and eager to burble on about the latest wheels and deals in which he was engaged, sitting huddled in a wholly uncharacteristic slump behind his desk. He did not rise to greet me, nor did he invite me to be seated. To his mumbled salutation—if that's what it was—I made no answer, but, towering over him from across his desk, I fixed him with my inquisitor's eye, while I rummaged in my briefcase. While I pulled out the N.T.S.B. report, my inquisitor's eye gave me a measure of his demoralization. His face was pale, his hair disordered and unsprayed, and, most significant of all, he was wearing a brown suit with a blue shirt and a rose-pink tie. His desk was littered with tabulated print outs on which he'd been scratching notes with a red pen.

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Despite a strong temptation to maintain an attitude of judicial solemnity, I forced myself to become more congenial. Mays and I were, after all, on the same side in this troubled affair. I needed the most cooperation I could get from him. I pulled up the guest chair by his desk, sat down, and put a grin on my face before I waved the report I was holding. "I imagine you've seen this. N.T.S.B. report on the Twinjet crash. What do you make of it?"

"I've seen the damn thing, all right. Them accursed N.T.S.B. investigators took up months of my time. And now you. Do we have to go into this right now? You've caught me in the midst of pulling last month's figures together for corporate, and I've got one hell of a manipulating job to do to make us come out on budget. You know how those damn pedantic beaureaucrats are back in Connecticut?"

I knew. The corporate grapevine rustled interminably with stories of how divisional presidents, trapped but clever, would, in shaky months, spend countless hours shuffling figures—borrow a little from next month by early shipment—disappoint a few creditors for a few days longer—curtail inventories a bit—misreport Product Line A to benefit Line B—apply all the techniques of modern creative financing—in their effort to meet the sacred budget. He had my sympathy. Unfortunately, the Supercorvolite problem put at hazard more than ten years worth of Aerocomponents profits, not just one month's. My task had precedence.

"Sorry to catch you at a bad time. We have to demonstrate urgency, or it'll go against us in court. So says Tommy Smith. I'm afraid I don't know enough about product liability law to argue with him."

"Then why are you bothering us?" Mays's lips had that peculiar twist to them I've observed on actors playing manic-depressives.

"Tommy wants me to collect what facts I can. He feels I've the technical expertise needed to help on that side of it."

"He does, does he? All right. Where d'you want to start?"

"I guess with the documentation."

"You know, I thought you'd say that." Mays pulled open a drawer of his desk, reached in, and came out with a fat file, which he almost hurled at me. "There's the whole wad of bumpf, lab reports, test reports, heat treatment certifications, the lot. I had 'em collected up for you because I knew you'd turn out to be another snotty paper grubber, just like the rest of our corporate princes and princesses. Will that satisfy you? When you've been through it, you'll see everything's by the book. G.B.I. Aerocomponents is in the clear."

I ignored his rudeness. "Everything turns on the hafnium addition. What do you know about that?"

An expression of insane cunning flowed over his face. "I don't know a damn thing about it. My theory is it's some N.T.S.B. political plot targeting G.B.I. But no doubt you'll discuss it with your tame local stoolie."

"My stoolie?"

"Yeah. The guy you write all those patents for. Sal Jordan. If there was hafnium put in, he's the one that did it."

* * *

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When I'd absorbed the shock of Mays's accusation against one I regarded not only as a good friend, but also as one of the most responsible technical people in the Corporation, I forced myself to a measure of tranquility. I asked him if there was somewhere where I could go read the papers he'd given me, get out of his hair, and later talk to Sal Jordan. He rang for his redhead, told her to take me along to the executive conference room, and told me to tell her when I was ready to see Sal. Could I, I asked, get Sal's personnel file to run through? Sure, he said. She'll see to that, too. Not once did he call his secretary by name. Just "she."

Much of what I had compromised the originals of documents contained in the appendices of the N.T.S.B. report. All the certifications appeared to be in order. There was one oddity I noted—many of the certificates, particularly those relating to the lab tests, were signed personally by Peter Mays. One would not expect a divisional president to perform such a chore, though there was not necessarily anything sinister about it. There could have been a score of reasons why he'd do it himself.

At the bottom of the pile I came across a couple of notes in Mays's hand—evidently summaries of telephone conversations. From these, I gathered the blades that became part of the engines of the crashed Twinjet were, at Corvo's request, delivered in a terrible rush. Corvo's planning and scheduling must leave a lot to be desired, if they needed such urgency on those two occasions. That could be a point in our favor. It was certainly a point in Mays's favor that he'd managed to cope with their emergencies.

Ms. Redhead—I don't know what else to call her—brought in Sal's personnel file. She asked if I'd have him come up to the conference room when I was ready to talk to him, or if I'd go down to his department. From previous contacts, I reckoned I knew most of what I needed to know about Sal. I told her I'd like him to come up, and that she might as well get him straight away. She said she'd do that, and left. I browsed through Sal's file, looking for, but not expecting to find there, something extra that might be relevant.

Sal Jordan, I calculated from his birth date, was sixty-three years old, married, father of three grown children. He'd worked for Aerocomponents for fifteen years.

He'd graduated from M.I.T. in 1948—those post-war accelerated courses—with double majors in metallurgy and aeronautical engineering. Wartime, he was just old enough (perhaps he lied a bit about his age) to learn to fly P-38s which he did in various parts of the world though he was a bit late for combat. After discharge, he'd remained a reserve officer, and was later trained on jets, but was not recalled for Korea because of the essential engineering work he was then doing for an East Coast jet engine manufacturer. After 1953, when his first child was born, he'd quit the reserve and given up flying. But in the resumé that had gotten him hired by Aerocomponents, he stated he was still in touch with a number of pilots, former buddies, who were always ready to share their thoughts con-

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cerning the operational qualities of the engines he helped build. (That, by the way, didn't surprise me. More than once I'd heard Sal express, in emotional tones, his conviction that engineers had a sacred duty to build for pilots engines as safe and effective as human ingenuity could devise.)

Sal's career had not been spectacular, though he'd borne heavy responsibilities. Before he came to G.B.I., he'd done a stint with every major manufacturer of jet engines in the U.S. of A., always as a hands-on engineer specializing in materials, and especially the nickel base alloys that comprise the core of all jet engines. He wanted to work for G.B.I. Aerocomponents—he was perfectly frank about it in his application—because he and his wife, their children by then off their hands, were tired of Northern winters, and wished to relocate to a warmer climate. His annual reviews throughout his term at Aerocomponents showed that his performance was consistently above the standards the division required of him.

The patents I'd written for Sal were, of course, part of the record. A flash of pleasure surged through me as I remembered working on them with this responsible and competent man. Resolutely I suppressed it. My inquiry was of a nature too serious to permit personal bias to creep in. At the same time I could not imagine that one of his temperament, with his record, would ever, by deliberate act, or through carelessness, place his employer in the unhappy position that now confronted us.

Ms. Redhead brought Sal along to the conference room. He was tall, stoutly built, ruddy complexioned, with a drooping Josef Stalin moustache. So far as I could tell, he'd not a line more on his face, was not a jot slower in his movements, than when I'd last seen him two or three years earlier.

While Ms. Redhead left us, I greeted him, got him seated, asked after his wife, his children. All well, it appeared. We embarked on our dangerous voyage together, plunging into the nitty gritty.

"You know why I'm here, Sal. You mind if I tape this, by the way?"

"Suit yourself." A surly response? No sour expression on his face to match it. I switched on my pocket recorder.

"Have you talked to anyone else yet? Peter Mays? The N.T.S.B. guys?"

"No. I guess everybody's too busy to talk to people who know the facts."

"Well, let's try and do this systematically. The N.T.S.B. report says the blades in Corvo's engines that powered the Twinjet did not meet the Supercorvolite spec. Is that true?"

"Yep."

"Did you know, before the blades were shipped, that they wouldn't meet spec.?"

"Sure did."

"How did you know?"

"Because I had the casting department put hafnium in the melts. Corvo don't specify hafnium in Supercovrolite."

"Did you tell anyone you were doing that? Your divisional president, Peter Mays, for instance?"

"I sure didn't."

"Please don't grin about it. It's not a matter to be taken lightly. Think carefully before you answer this next question. Why did you put hafnium in the alloy, Sal?"

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"Two reasons. One, technical—to stabilize the gamma prime, which is the micro-constituent of these nickel alloys that gives them high temperature strength. Two, humanitarian—to save the lives of anybody flying with those blades in their engines."

"I'm not with you. Are you suggesting that Supercorvolite without hafnium's defective in some way or other?"

"It don't deserve to be called super. It's the cheapest crap that ever got qualified for an engine. But it'll work—marginally—if the heat-treatment schedule's followed precisely, and all the tests are done, and any blade lot that fails is rejected."

"So? Surely it's part of our contract with Corvo to do those things."

"Yep. With Corvo. Mays's other contract is with G.B.I. Corporate, to come in on budget every month."

"And—"

"Them two contracts are incompatible. If he's going to make budget, he can't afford, one, to buy the new state-of-the-art equipment we need to do the heat-treatments properly, or, two, to do the tests and accept the rejections that come from the junky process equipment we have to use. Given the priorities Corvo obviously has to suffer. What's it matter, the sacrifice of a few people, as long as the numbers come out right?"

"Come on, Sal, you're too bitter. N.T.S.B. themselves ran tests on blades from the crash. They were OK. Besides, I've got all the certs here, plenty proof that the ones in question were heat treated right, met every test requirement."

"You see who signed your precious documents?"

"Peter Mays. In theory, they couldn't have a more responsible signature."

"Sure. You know any other operation where the president signs things like that, instead of someone down the line? You want to go to the lab, verify the tests results?"

"You trying to tell me the tests weren't done?" By the minute, this affair was becoming more ominous.

"Hey, any time the testing was done, Peter Mays would have his bottom line for the month cut in half. You think he'd take a risk like that?"

Ahead of me were dreadful things to be done. I set my face hard to squeeze out the last trace of personal bias. "Isn't it your duty, if something like that's going on, to blow the whistle? Stop it from happening?"

"Wally, I'm just a year off retirement. You want I should gamble with my pension?"

Sympathy, I told myself, can play no part in this investigation. Still, I softened a bit. "Tell me about the hafnium. What's that got to do with it?"

"Simple. Half to one per cent hafnium in Supercorvolite spreads out the alloy's tolerance for errors in heat treatment. Stabilizes the gamma prime. With the hafnium there, I can guarantee, even without tests, we'll meet spec. I can sleep nights, don't have to worry about airplanes falling out of the sky, or about getting fired for telling tales."

"Hafnium's pretty expensive, isn't it? How could you lay hands on it without going through purchasing, without letting Mays know?"

"Easy enough. We got a whole lot of the rare metals lying around that were bought for one thing or another over the

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years. For all our sakes, don't tell Mays. We've kept these stocks hidden, against emergencies like this. He's been too dumb to find them, but if he does, he'll sure sell 'em off to boost his bottom line."

"D'you feel good about all this, Sal? I'm not sure I'm getting through to you, how serious it all is. It's going to do a lot of damage to G.B.I. Maybe put Aerocomponents right out of business."

"It won't do that. The Department of Defense won't allow it. I feel all right. Why shouldn't I? A bit of inconvenience for the Corporation's a whole lot better than dead pilots. Or passengers, for that matter."

"We do have one crashed plane."

"And nobody was killed, right? I've read the N.T.S.B. report. If a pelican had been sucked into an engine without hafnium in the Supercorvolite, chances are them blades would have been so brittle, they'd have disintegrated. Torn the plane to pieces."

If that had happened, I reflected, maybe there'd have been no evidence available to be used against us. I smothered the thought the instant it was in my head. By then I was surfeited with answers. I couldn't think of another question to ask.

Sal said: "As I see it, the biggest problem we got is this. I just found out there were two or three blade shipments after Mays stopped testing, before I started adding hafnium. Some poor sods are probably up in the sky right now relying on them blades for their lives. What're you going to do about that?"

Poor sods, I thought. Poor G.B.I. Poor Trapped Peter Mays. Poor Sal. Poor me.

I'm back in my motel now— scribbling —which is what I do to exercise demons.

What the hell *am* I to do with this bucket of worms?

Tell the whole truth? ■

●Many would be wise if they did not think themselves wise.

Gracian

●One of the greatest pains to human nature is the pain of a new idea.

Walter Bagehot

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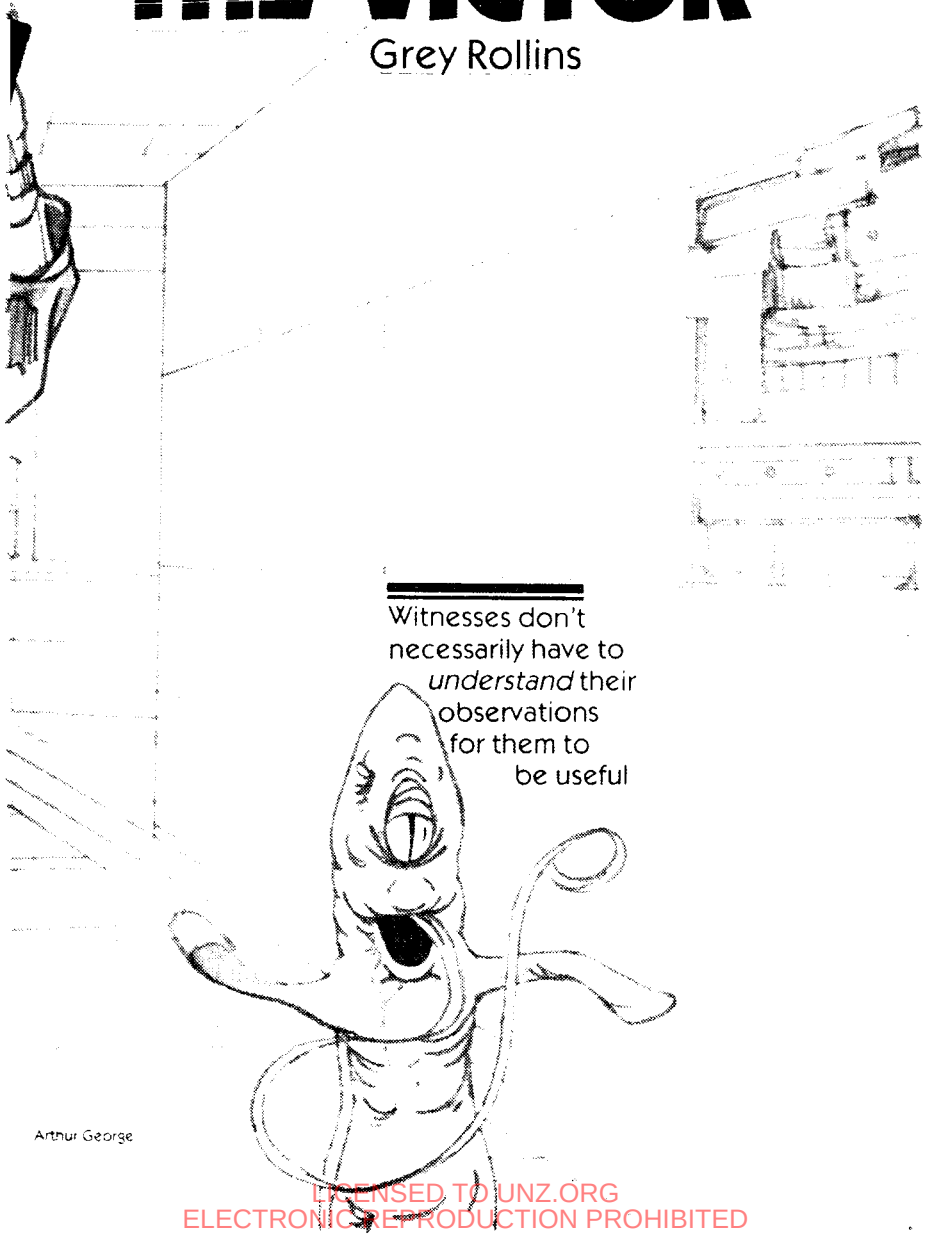
THE VICTOR

Grey Rollins



Arthur George

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There are days when I wonder why I even bother to try to stand between Martin Crofts and disaster. He seems determined to destroy himself by acts of commission, such as driving like a madman, as well as by acts of omission, such as refusing to get out of bed.

Getting out of bed was today's problem.

Since he was not alone, I tried a somewhat more subtle approach than usual. I stood by the bed and began to play "Morning" from "Peer Gynt"; the quintessential musical depiction of a sunrise. This is quite easy for me to do, as I speak using a tympanum rather than vocal cords, such as humans use. I can, with perfect fidelity, play all the portions of the orchestra without strain. If this is difficult to imagine, pretend that my tympanum is a stereo speaker, able to reproduce many frequencies at once. Playing the music is easy—the hard part is being able to recite the entire piece from memory—violins, cellos, flutes, and all.

Marie stirred first, raising up far enough to peer over Martin's inert form. She winked at me and said softly, "Good morning, Victor. Didn't the alarm clock go off?"

Speaking over the sound of the music was no more difficult than adding another viola. "Oh, yes. It went off forty-two minutes ago. Martin turned it off and went back to sleep."

"Obviously," she said wryly. "I must have been sleeping pretty soundly myself. I didn't hear it at all."

"Do you see any signs of life?" I asked.

She inspected him closely and shook her head. "None."

"OK, hang on. Here goes phase two."

I hit Martin with a Sousa march, maximum volume, point blank range.

He positively levitated out of the bed. Springing to the floor with the sheet trailing after him, he stood quivering. His eyes were wide open windows to an empty mind; his soul had yet to inhabit his body for the day.

"Good morning, Martin," I said politely. "Since you are self-employed as a private investigator, you can afford to sleep in without fear of being fired. However, Marie has a more conventional job at the police station and may find herself in considerable trouble if you don't shake a leg and get her to work on time."

He made no response. "*Hey!* Down here, buster!" I stomped on his foot to get his attention. That's not as bad as it sounds. I am only three feet tall and my legs resemble nothing so much as six-inch elephant legs. Just leathery pads on the bottom, so I didn't really hurt him.

"*Mmmpf!*" he finally responded.

I knew better than to be satisfied with that. There have been times in the past when I got him to the grunting stage and went back twenty minutes later to find him flopped backwards across the bed, snoring.

Time to resort to serious methods.

I unraveled a foot or two of tongue and stuck it in his belly button. Faced with the ultimate violation of his personal space, he squawked and jumped backwards, tripping himself with the

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sheet in the process. The crash as he hit the floor shook the entire apartment.

Marie was caught between laughter and horrified embarrassment at her uncovered condition. She plucked at a free corner of the sheet and tried futilely to cover herself. Intellectually, she knows that I am not human and do not care any more about nudity in humans than in squirrels, but some reflexively conditioned portion of her mind insists that she maintain a semblance of modesty around me.

I surveyed the wreckage of my best human friend and turned to her. "I'll leave the rest to you, Marie. It's a quarter of seven—if you keep at him, he just might manage to get you to work on time." I walked out and closed the door behind me.

For most human females I would not have gone to the trouble. Marie was an exception. She had an earthy, practical nature that I judged to be good for Martin. She also was a more than adequate cook, drawing on her Italian heritage to create culinary masterpieces that were far more nourishing than the cold cuts that Martin ate if left to his own devices.

And, wonder of wonders, she didn't mind if I ate the leftovers . . . after they had been left out for several days, of course.

Martin steadfastly refused to get in gear. Even after we dropped Marie off at work, just five minutes late, he still acted as though he were trying out for the part of a zombie in a grade B horror movie.

"Martin?"

His reply was completely unintelligible, even though I pride myself on my excellent hearing and ability to decipher even his most obscure grunts. I decided to leave him alone and hope for the best. With luck he would be speaking English by lunch. But then again, maybe not.

The morning was bright and brisk, the first hint that fall was around the corner. Martin parked behind the building where our humble office is located without seeming to look where he was going. At least he had not been driving at his usual breakneck pace. It's harrowing enough to ride with him when he's alert—the idea of doing so when he's only half awake is enough to give any sentient being nightmares.

With my short legs, getting up the stairs to our office was something of an endeavor, but the alternative was to get Martin to carry me up. Not that he doesn't carry me routinely, especially when we need to get somewhere more quickly than my short legs will carry me, but in his present state I wasn't willing to risk it.

He unlocked the door and staggered into his inner office, leaving me to get the lights turned on. Without bothering to ask, I started the coffee maker and waited patiently for it to gurgle out the one true cure for Martin's sluggishness.

Steaming cup in hand, I entered his office and carefully placed it on the corner of his desk. "Drink," I ordered. "You're of no use to me or yourself in your present condition."

He reached for the cup and leaned back in his office chair. The springs let out their usual bone-shredding discordant shriek. "That woman hates me," were his first coherent words of the day.

Having achieved a perfect non sequitur, he said no more.

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"Marie?" I ventured. "I was under the impression that you two got along quite well."

"That's what I said. She hates me."

I pondered this for a moment and reached the conclusion that I had been mistaken about his words having been coherent. "I think I missed something, Martin."

He sipped at his coffee, wincing at the heat, before speaking. "She's insatiable. I think she's trying to kill me. Ergo, she hates me."

The figurative light went on above my head. "Ah! She must have kept you up late last night."

"Late, hell . . . she kept me up *early!*"

I was about to make a sharp reply, but Martin was spared the killing edge of my wit by the telephone. I scurried out to my desk to answer it.

It was Pete Sims. He's our ally at the police station. Well . . . other than Marie, but she's more along personal lines.

"Victor, I've got a problem."

"Wait a moment, let me get Martin for you."

"Hang on a second there, buddy. Let me speak to you first. You'll probably be more help to me on this than Martin will."

"Especially this morning," I muttered.

"Huh?"

"Never mind. What can I do for you?"

"We've got a dead body that we aren't so sure about."

"You're asking me if he's dead? Call a doctor. There—case closed. Glad to be of service. Have a nice day." I was a bit testy from having to deal with Martin.

Fortunately, Pete and I are on good terms. In some ways he understands me better than Martin. "What a comedian! Listen, banana brain, it's not the dead part that has us confused—it's *how* she died. She seems to have had a grand mal epileptic seizure, but worse."

"Then she was an epileptic."

"She wasn't."

"Oh."

"Yeah . . . oh. Every bone in her body has been pulverized—she bit off her tongue. She used to be a pretty girl, but you wouldn't know it to look at her now. She looks as though she was hit by a truck, but she did all this to herself."

"Suicide?"

"No, I mean like it was all done internally."

"But—"

"But how do I know? I know because we've got a guy here who watched her die."

"I'm confused," I admitted. "Why don't you just start at the beginning."

In his dry, concise way, Pete outlined the whole thing. Her name was Monica Grimes. She had been transferred in from Detroit to help with an undercover drug investigation. She had been successful in penetrating the target organization and had reported at regular intervals for the last two months. Thursday, she had missed her third consecutive contact. Missing one was nothing to worry about. Two was not unheard of, although bothersome. When she missed the third, her partner began to climb the walls.

Earlier this morning—Monday—her

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partner had been getting out of his car at the station, not ten minutes after we had dropped off Marie, when a nondescript blue sedan skidded to a halt behind him. The back door had been opened from the inside and Monica had been thrown out on the pavement.

As the sedan sped away, she began to have massive convulsions. She was dead within minutes. Her partner swore he would never forget the sound of her bones splintering as she dashed herself to death against the asphalt.

The significance of their having picked him to witness her death had not escaped anyone. It was assumed that they had broken her after they had blown her cover and that his involvement was known.

I stood silently for several moments after Pete finished relating this grisly tale.

"Pete."

"Yes, Victor."

"I don't like the sound of this one. These are not nice people."

"I'd say you got that part right."

"Pete, if I were you, I'd take another fishing trip and let them cool off a bit."

He sighed heavily. "Can't do that, Victor. For three reasons. One being that it goes against my grain as an officer of the law to let one of my own be killed. Another is that, since I coincidentally happen to work homicide, the case was dropped squarely in my lap."

"What's the third reason?"

"I liked her, Victor. She was a genuinely nice girl."

"OK, I can understand that. One last question before we get to work."

"Shoot."

"Why me?"

"For the good and simple reason that you impressed the hell out of me with the way you tripped up Matthew Shoemaker when he murdered his father with that colawhateveritwas."

"Cholecystokinin tetrapeptide."

"Yeah, that stuff. I was thinking that you might be able to figure out what happened to Monica. We can't tell what they used on her if we don't know what to test for."

We talked for a while longer, but I was unable to get even the faintest glimmer as to what Monica might have been given. Not that it's so difficult to cause convulsions—even violent ones—the problem was that there were so *many* possibilities.

After Pete hung up, I went into Martin's office. "Looks like we've got a case," I told him. "It's an ugly one."

Practicing economy of movement, he raised only one eyebrow. "Tell me more."

I gave him a quick rundown and added the fact that Pete had managed to get us hired as "forensic consultants" for a few days. The rate was lower than our usual, but since Martin and I live a hand-to-mouth existence, I didn't think he would complain.

He didn't. "I see this the same way that you do. These are not your average, well-intentioned, God-fearing citizens. It would probably be wise to carry my gun."

"Good thinking."

He reached into his center desk drawer and prodded around, paused, patted his pockets, peered under the piles of accumulated papers on top of his desk, searched the drawer again more care-

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fully, and finally turned to me. "Um, Victor, I can't seem to find my key."

"The one to the locked drawer where you keep your magazines with the pictures of naked ladies?"

He blushed. "Uh . . . well . . . yes, those and my gun."

"No doubt you are waiting for me to offer to unlock it for you."

His face went through several distinct grades of revulsion before he was able to master himself. "Yes," he ground out.

My species is possessed of tongues that are outlandishly long and slender by human standards. Since our arms are vestigial—I can comfortably hold the weight of a telephone but not much more—we use our tongues as a delicate third appendage.

Picking locks was something I had read a bit about once when I was spending the night at the office. Since I do not sleep, I spent the rest of the night developing a technique utilizing my tongue. By morning, I had learned to pick every lock in the office—among them the one to the drawer in Martin's desk.

I went and found a clean napkin and dried the tip of my tongue, since Martin has difficulty with the idea of my saliva on things. The graphite based lubricant in the lock tasted bland as I felt out the pins. In a moment, I had the job done and rotated the plug. The drawer opened easily.

Martin forced himself to thank me, but I could see that his heart wasn't in it.

"Don't strain yourself, Martin. I promise I didn't drool and rust your lock."

He shuddered. "There are times when I'm glad that you're strange and times when I'm not. This happens to be a time when I'm both."

"Next time you can use *your* tongue," I retorted.

We parked in one of the visitor's slots at the police station. It's near the door, so Martin didn't bother to carry me in.

Marie met us just inside the door, but maintained a cool, professional manner, offering to take us back to Pete. Martin accepted calmly enough, but his eyes gave him away. That and his silly grin.

Martin has this bizarre effect on women. He's over six feet tall, black hair, intense green eyes. Women seem to want to test themselves against him—a sort of human Everest. Most of them make little lasting impression, but Marie seemed to be an exception. He was beginning to look at her a little differently than he looks at most women. I found this gratifying. I hardly look like the classic, cherubic conception of Cupid, but I was doing my best to act the part.

She took us to Pete's desk and departed, giving Martin a smoldering stare as she brushed past him on her way out. Martin blushed in spite of himself.

Pete observed this and cocked his head. "So she finally caught you, did she?"

"She didn't catch me, I caught—" he protested.

I interrupted, "She not only caught him, he swallowed the hook. The only problem is that he's too dumb to notice."

Martin gave me a withering look which I ignored.

"What happened to your desk, Pete?"

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I asked. Normally it was piled deep with the wrappers from the hamburgers that he used to keep his potbelly fueled. This morning the only consumable was a steaming mug of fresh coffee.

He looked grim. "It's time for me to earn my keep. I'll be damned if I'm going to let them get away with killing Monica. This desk is going to stay clean until I catch them." He ran his hand though his thinning red hair. "We've got something new since I talked to you. They've found the blue car."

"Stolen, of course," I put in.

He nodded. "Yup. I honestly doubt that we'll find anything useful, but we've got to try. I'll have a report on it within the hour."

While we were talking, the results of the tests on Monica's body came in. Pete scanned them quickly, then tossed them on his desk in disgust. "Nothing."

"Nothing?" Martin asked.

"Oh, there's plenty there all right. Cause of death was trauma occurring in the occipital region, or some such doctor lingo. The problem is that it says *what* happened, not *why*. Why is going to be the key."

"But . . ." Martin began.

"They don't know what to test for, Martin," Pete explained patiently. "All the tests are for specific things. If you don't know what you're looking for, you're just shooting in the dark."

In the end Pete did the only thing he could do. In one of Monica's last reports, she had related that she had overheard a conversation wherein a warehouse 'down on Washington Street' had been mentioned. He sent out a patrol car to look for an abandoned warehouse on Washington, since it was a cinch that they would have packed up and left as soon as they found that Monica had penetrated their organization.

Noon passed. There was an almost tangible tension building in the air at the police station. People bustled to and fro, leaving behind a continually deepening layer of files, reports, and data printouts on Pete's desk. He was the nerve center of a rapidly constructed beast of legal revenge with but one purpose—to find Monica's killers.

As prophesied, the report on the stolen car told us little. No usable fingerprints had been found, no matchbook covers, no torn shreds of clothing, nothing. There had been no word yet from the cruiser on Washington Street.

Marie came in with a cardboard tray from a takeout service a block away. "I thought that you gentlemen might work better if you had some food in your stomachs." She turned to me. "Victor, I'm sorry, but they didn't have anything on the menu that looked like it would suit you."

I come from a world where the climate is so tropical that it puts the Amazonian rain forest to shame. We are scavengers—one of the few intelligent races discovered so far that are not hunters. Our adaptive preference is for food that would be regarded as spoiled by humans. Basically, we have no choice. Anything that dies begins to rot almost immediately.

"Thanks, Marie. I'm a little hungry, but I can hold out. If necessary, I'll go prowl a few dumpsters."

She screwed up her face. "Smelly."

"Tasty," I corrected.

Martin looked up from squeezing the contents of a ketchup packet onto his

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hamburger. "Hey, do you mind? We're eating here."

Marie grinned saucily. "Sorry. I'll be going now."

Pete glanced at Martin, then at her. "Naw, stay. If you don't have anything else to do, that is."

Without further prompting, she pulled an empty chair around from another desk and sat in it backwards, resting her chin on the high wooden back. "Looks like you fellas were hungry."

"Want some of my burger?" Martin offered.

"Heavens, no. I ate an hour ago, Martin. It's nearly two."

"And no solid leads to go on," Pete groused between bites.

"I want to find them as much as you do, Pete," Marie said, "but it's been less than six hours. Short of a miracle . . ."

As though her voice were the key, the phone on Pete's desk rang. He quickly wiped his hand on a napkin and picked it up. After a few curt, monosyllabic replies, he slammed the phone down and stood, leaving the rest of his lunch uneaten on his desk. "Time to go. They've found the warehouse."

Martin bounced up from his seat, shoving the last bite of his burger into his mouth. "Sweay whoo aiter," he told Marie.

"What?"

He gulped hastily and pecked her on the cheek. "See you later."

Martin snatched me up and tucked me under his arm. Knowing what was coming, I reached behind and grabbed a belt loop for extra support as he began to trot down the hall after Pete. Unable to focus as the doors and people whipped past, I closed my eye and hoped for the best. Sometimes when Martin is in a hurry he is not as careful about clearance around door frames as he should be.

We pulled up next to the cruiser parked in front of the warehouse on Washington Street less than twenty minutes later. The officer leaning against the hood was one I did not recognize. As Pete got out of the car, he came to a ramrod-straight posture and began a rapid, clipped summary of what he had discovered so far.

Pete waved him off. "Just tell me one thing. Did whoever leases this joint know that the tenants were leaving?"

"No, sir. They said that the lease had been paid up through the end of the year. There were—"

Pete fluttered a hand at him, already turning to study the front of the building. "Yabba, yabba, yabba . . . for the moment, all that we care about is that we have what appears to be a hasty departure."

"Yes, sir. As I said—" At that moment, the officer caught sight of me. His eyes bugged.

"What's *that?*" he asked, all composure gone.

"I'm not a 'that,' " I assured him. "I'm a 'who.' My name is Victor."

His jaw started working. He turned to Pete. "Uh, sir, who is that?" he asked, pointing at me.

Pete turned back from inspecting the front of the warehouse and said amiably, "Like the fella says, his name is Victor. I'd consider treating him real nicely, if I were you. He knows more about proper detective work than any three other men I've ever known. If you treat

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him right, he might let you hang around. You could learn something that way."

The new cop considered this for a moment, then impulsively stuck out his hand. It came barely within reach of my short arms, but I gravely shook with him.

"Glad to meet you," I told him. "What's your name?"

"Tad, sir."

"Unusual last name, Tad. I've never met anyone with a surname of Sir."

It took him a moment to get it. Then he wasn't sure he should laugh. He compromised by grinning. "You want me to call you Victor, right?"

"Right."

"Have you gotten a warrant to search the premises?" Pete asked.

Tad turned back to Pete. "Yessir. It was dropped off just before you got here."

Pete nodded. "Well, gentlemen. Let's see what, if anything, remains to be seen."

There was a chain link fence around the perimeter of the concrete parking lot in front of the warehouse, but this was easily circumvented. We slipped through a rent in the fence where it abutted the building. Sometimes my small size has advantages—my human comrades had trouble squeezing through.

Pete led the way across the front of the building, stopping at every window and door to see if any were open. None were, but one of the windows had a broken pane that allowed him to reach inside and flip the catch holding the window shut. Within seconds, he was standing inside and reaching back out to give Tad a hand through. Then Martin picked me up and passed me through to Tad, who carefully set me down as though I were a priceless Ming vase. Martin came through last.

We were in an office. It was dirty, but the dirt was from heavy use and lack of housekeeping, not the quiet, delicate dust of long emptiness. Pete slid silently through the door.

Three long stainless steel topped tables stood parallel to one another in the middle of the floor of the main room. Sinks were spaced regularly down the tables, the plumbing exposed amid the tubular metal legs. A large metal drum stood off to one side. It appeared for all the world to be a mixer, although I couldn't see the need for such a bulk device when the tables seemed to indicate smaller batches were being manufactured. Pete, Martin, and Tad split up and started to examine the room, leaving the tables for me.

"If any of you should happen to find the circuit breakers, we could use some light in here. The windows aren't much help, being so dirty," I called out.

Three grunts of acknowledgement came from different corners of the room. Inhaling deeply, I shunted the air through the nostrils in the roof of my mouth. Faint odors from an assortment of chemicals came to me. Deciding that I would be able to do more good by smelling than I would by looking over the tables, I closed my eye and began to sort out the odors.

A few moments later a call came from diagonally behind me. "Hey! I've got something over here."

The echoes bounced off the walls and high corrugated metal ceiling for ages, almost masking a slight rasping sound. Rats, no doubt.

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I waddled down the aisle between two rows of empty shelves. At the end there was another aisle between the end of the shelves and the outside wall. I saw Tad standing four rows away, in the corner of the building. At his feet was a large cardboard box with a plastic liner. It had been dropped and split open. White powder had run out on the floor.

I got to him just before Martin and Pete got there. The powder had no smell to speak of and I wasn't about to taste it without knowing at least in a general way what it was.

Pete took one look at the box and turned to stare back the way he had come. "I don't like this," he muttered. "Nobody drops boxes in corners like this. It's a setup."

A repeat of the rasping noise behind me made me turn just in time to see a man step from behind a row of shelves and casually aim a machine pistol towards us.

I'd heard rats all right, but not the four-legged variety.

"Quite correct," came a voice from another, nearer, aisle as footsteps approached. "We have you in a corner, covered by three separate lines of fire. I suggest that you drop your weapons on the floor. Carefully."

The man who reached the end of the aisle was cadaverously thin, tall, but somewhat stoop-shouldered. His gray hair was combed straight back, leaving the dome of his forehead uncovered. He held a pistol in his left hand.

"That's right. Easy does it." He nodded approval as Martin and Pete slowly bent and placed their guns on the floor.

Some humans report seeing things in slow motion in a crisis. I have never experienced this phenomenon. What I saw was the sudden tightening of Tad's jaw as he changed his grip on his gun and tried to take aim on the man who had been speaking.

He never should have tried it.

The man with the machine pistol squeezed off a burst almost carelessly. The slugs passed over my head, catching Tad full in the chest. That would have been sufficient, but another gunman, which I hadn't been able to see from where I was standing, fired at the same instant.

Tad was pinned against the unyielding cinder block wall. When the guns stopped firing he slumped to the floor, breathing raggedly. His eyes were unfocused.

The tall man spoke again. "Now, if one of you would be so kind as to remove the gun from his hand and place it on the floor. . ." he said conversationally. His tone would have been perfectly suited if he had been asking someone to pass the salt at the dinner table.

I elected to do the job. I knew Pete wouldn't try anything, but Martin is unpredictable under sudden stress.

It was difficult prying the gun from Tad's hand. I believe he was still partially conscious in spite of the terrible damage done to his chest. He was only trying to do his duty. He just hadn't counted on being outgunned.

I prized the blood-slick revolver loose and carefully placed it on the floor between the other two. "He's badly hurt, but there's a chance that he might live," I said. "We need to call an ambulance."

The man stared down at me for a few

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moments before answering. "Perhaps he should have thought of that before he so foolishly tried to use his weapon."

I could hear Pete's jaws grind. His eyes had turned to slate. "The box was left here on purpose. You wanted us in the corner. You knew that sooner or later one of us would find it and we would all be gathered in the corner."

The man nodded. "Yes . . . exactly. You see, I wanted to ask a question."

"Ask away," Pete said, not taking his eyes off of the other.

"Very simple, really. I want to know what the girl told you."

"Enough."

He shook his head slowly. "I'm afraid that won't do. I require more specific information."

"What did you do to her?" Martin asked, diverting the conversation.

"The girl? Just a slight overdose of a, shall we say, *recreational* chemical."

"What you did to her was not recreational in any sense of the word. Unless, of course, you're a very sick human being," Pete grated.

The man actually had the gall to smile.

I do not believe in the inherent sanctity of life, but I do regard senseless killing as inefficient. When unavoidable, it should be done with care that the victim does not suffer unduly. That any being should derive satisfaction from causing unnecessary pain is an affront to my ethics. I silently vowed that this man would not escape justice.

"Ah, but we can't have people sneaking about, pretending to be something they're not. Bad for business, you know."

"And exactly what *is* your business?" Pete demanded.

"Haven't you guessed? Don't you know? Isn't that why you sent the girl?" He stroked his chin with his fingertips. It was almost a caress. "Perhaps not. Perhaps she didn't tell you much after all." He smiled that obscene smile again. "Ah, well. It won't hurt to tell you this much." He glanced down and ran a finger lightly down the barrel of his pistol before continuing. "You see, for many years cocaine was one of the more profitable areas in the illicit drug market. However, its very success caused its downfall, speaking from a purely financial viewpoint. More and more people came into the market, each dreaming of getting rich. The net result, of course, was that it became a buyer's market and profit margins suffered."

"And you figured out a way around it," Pete said.

"Indeed. Simple, really. I began by studying the way that cocaine affects the body. The human body, that is," he added, eyeing me. "One of the principle effects of cocaine and its derivatives is a general release of dopamine in the brain. Dopamine in small quantities creates a feeling of well being. When released in larger quantities, it causes a euphoric state." He smiled unpleasantly. "One of the side effects is that it stimulates the limbic system. The limbic system, in turn, is involved in the release of hormones that trigger sexual pleasure. Needless to say, that is the reason that sex and coke are so commonly linked."

"This is news?" Pete demanded.

A brief flash of something that might have been anger lit the man's eyes.

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"Not news . . . background. My own small contribution was to design another, similar, compound." He paused. "Perhaps you are aware that nerves carry their impulses electrically through the length of the nerve fiber itself, but once the signal reaches the end of the fiber it must be converted to a chemical reaction. This chemical reaction causes the next nerve cell to fire electrically. Back and forth, back and forth, the signal flip-flops from chemical to electrical and back again. The chemical reaction is the limiting factor in the speed of the nerve impulse. After all, electricity moves quite swiftly. Nerve impulses are limited to something on the order of two hundred miles per hour by the slowness of the reaction. I have discovered a way to cause the chemical reaction to proceed more quickly, thus achieving a net acceleration of the entire central nervous system. The brain, already in a euphoric state from the dopamine, is now presented with a much larger sensory input than it is accustomed to. The result, I am told, is quite pleasurable. It is also very, very addictive."

"So you're making your own, unique, drug. That way you can keep the price artificially high since you have no competition." Pete nodded. "A nice setup, if you can get away with it."

"Oh, but I *have* gotten away with it." He swept his arm to include the vast empty warehouse behind him. "I will be back in production the day after tomorrow."

"So what was it that you did to Monica?" Martin asked.

"Oh . . . that." He waved his hand negligently. "Too much of my drug overloads the brain. The sensory input from any source is so powerful that it causes the body to flinch involuntarily. The contraction of the muscles, in turn, causes its own set of impulses. In short order the brain is caught in such a powerful state of overstimulation that it causes an electrical storm somewhat akin to an epileptic seizure. Naturally, the senses report the resulting convulsions in an amplified manner and this only serves to further stimulate the brain." He paused. "You are perhaps familiar with the term positive feedback in electronics? Same thing. The central nervous system oscillates further and further out of control. Death is, regrettably, unavoidable."

His tone of voice seemed to indicate that he was anything but dismayed by the prospect. He looked down at Tad. "I believe that death is unavoidable in his case, as well."

"Death waits for all of us, friend," Pete said, ice in his voice.

The man glanced at him. "So it does. In your case, however, I believe I shall hasten the appointment."

He cast an appraising glance across the room at the wooden inner wall that partitioned off the offices, including the one through which we had entered. "I have always thought that this building was a fire hazard. Surely it will come as no surprise when it burns."

"With us inside, no doubt," Martin said.

Again, the unpleasant smile. "Let's just say that I don't like uninvited guests." He turned to the man I could not see. "Lock them in Glenn's old office. Wait ten minutes. Then open those five gallon drums of ether that we hid in the bathroom and splash it across

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that end of the room. Light the pile of newspapers on this end of the room and leave immediately. When the fumes from the ether reach the flames, there will be a very satisfactory explosion, so I recommend that you not waste any time leaving the area. As a matter of fact, you might even go so far as to run. Ether is *very* volatile."

"That's it? You're going to burn us to death?" Pete asked.

The man nodded. "That, as you say, is it. All I wanted to know was whether the girl had managed to get out any useful information. Obviously she didn't, so I have no further use for you." He turned to leave, but stopped and looked back. "Incidentally, you might be interested to know that the girl proved a very tough nut to crack. Commendable, I'm sure, from your point of view. To the very last, I was never certain that I had extracted all the information from her that I wanted. Amazing resistance, for a woman."

The gun-bearing men closed in as he walked away. Motioning with their guns, they guided us to an office that had no window. The door was slammed and locked.

Martin looked grim. "We're in a bit of a jam here."

"Quite," Pete replied, imitating the pistol-toting man's delivery.

"Got any ideas?" Martin asked him.

"None spring to mind."

"You didn't ask me," I pointed out.

Pete's brow rose as Martin whirled. "What?"

I flickered six inches of tongue. "Victor's Lock Service, at your disposal."

Martin gaped. Pete's response was more practical. "What about the men?"

"It will require excellent timing," I admitted.

"You have a captive audience," Martin noted. "Tell us more."

"Once the men light the newspapers on the other side of the room they will not be disposed to wait around. They will, no doubt, go out the back door. At the instant that we hear the back door slam, we will bolt for the front door."

"What about Tad?" Martin asked.

"I'm afraid it's too late for Tad. His breathing had ceased before we left the corner."

Pete clenched his jaw and muttered to himself. With my acute hearing, I could pick out parts of what he said. There was nothing I would dare repeat in mixed company.

"If you two will excuse me, I will get to work on the lock. It would be best to get that out of the way, as I am not familiar with this model and it may take a few moments for me to feel out the pins."

With exaggerated politeness, Martin stood aside and waved me past. I sidled up to the lock and eyed it for a moment before commencing.

"Tastes awful," I commented as I probed. "They must have used battery acid to lubricate the lock."

"How does he talk with his tongue stuck out like that?" Pete asked Martin.

I took the liberty of answering for Martin. "My tympanum forms the complete sound of my speech. I actually have to compensate for the obstruction of my tongue."

"For God's sake, Victor," Martin

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said. "Concentrate on the lock, not talking."

"No problem," I said, as I raised the last pin the proper distance. "The deed is done." I rotated the plug and felt the slightest bit of give in the doorknob. "Now all we have to do is wait a few minutes for the sound of a slamming door."

"You make it sound easy," Pete said morosely.

"Gallows humor," I replied. "Incidentally, this would not be a good time for you two to forget that I cannot run as fast as we will need to run. Don't forget to pick me up on your way out the door." I received two nods of assent.

The minutes crept by with agonizing slowness. There was no sound from outside the door.

"You don't suppose—" Martin began.

"Shhh," Pete hissed. Sure enough, we heard the faint sound of the two men talking.

The sound of the ether splashing against the door startled me. It was only seconds before the odor began to permeate the room. There was no audible sound as the men crossed the room and lit the newspaper.

A door slammed with a sound like the gates of hell.

Martin and Pete erupted into motion. They both rushed towards me with the same intent—to pick me up. Realizing that they couldn't both carry me, they both stopped and looked at each other. Precious time was being wasted.

"Martin, pick me up. Pete, you open the door."

Once I gave direction to their energy, we were in motion with terrifying speed. The door was flung open. Martin bounded through carrying me. Pete fell in behind us as we dashed for the front of the building.

The odor of the ether was much stronger now. Sickeningly sweet.

Martin skidded to a stop at the front door and tried to open it with his free hand.

"Damn! I can't get it," he cried.

Pete shoved him aside and grappled with it. "Locked!"

"Put me down!" I told Martin. I felt out the lock with frantic haste. Turning the plug, I leaned against the door as I pulled my tongue out.

Martin snatched me up as he burst out the door, Pete on his heels.

We made it nearly ten feet before the explosion hit. Flames licked the soles of my feet as Martin was thrown face forward to the pavement. He scrambled to his feet, still holding me, and turned to help Pete.

The only way out was through the same tear in the fence we had used to enter, even though that led us back up against the wall of the burning building. Broken glass from burst windows was everywhere.

Martin and Pete pounded across to the car. Pete had the car started and was burning rubber in reverse before Martin could get the door closed. Two blocks away, Pete pulled diagonally into an empty parking lot and jerked the microphone loose from beneath the dash. Once he had called for the fire department, an ambulance, and police backup, he threw the microphone on the floor and collapsed backwards in the seat, breathing heavily.

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"Martin," he gasped.

"Yeah?"

"Are we alive?"

"I think so." Martin said. He looked down at me. "You OK, little buddy?"

"Nothing that won't heal. You fell on me when the building exploded. Not that I'm blaming you—I would have fallen too—but I hurt in places that I didn't even know I had places to hurt."

"You and me both, Victor."

We sat at Pete's desk after having been attended to by a paramedic. Marie hovered solicitously over Martin. Pete and I were left to fend for ourselves. Pete had lost some hair to the flames and had a nasty gash on his temple. Martin, like me, was mainly bruised, with sundry scrapes on his knees, elbows, and face.

"Bad guys two, good guys zip," Pete said.

"Huh?" Martin asked.

"Monica and Tad. They've nailed two of us and we haven't so much as scratched one of them."

"I'd hate to raise hopes, but I might be able to help," I offered.

"I can use all the help I can get," Pete said bitterly.

"Do you have access to acoustic spectrum analyzers, noise reduction units, graphic equalizers, and the like? We will need to extract speech from background noise."

Martin frowned at me. "Speak English, Victor."

"I can reproduce the conversation that the two men were having as they spilled the ether. Parts of what they said were lost in the noise, but I was able to make out that they were talking about meeting the man with the pistol somewhere."

Pete stared at Martin, his eyes wide. "Can he really do that?"

Martin shrugged. "I dunno, but he can do a helluva symphony orchestra."

Pete leaned back in his seat and bellowed at the top of his lungs. "*Fred!* Somebody find Fred and get his ass in here on the double!" He looked back down at me. "I'll be damned, a friggin' tape recorder with legs."

Fred turned out to be a wizened man with a gray goatee who spoke in whispers. He took one look at me and scowled. "You want me to *what?*"

Pete spoke very calmly. "Victor is going to play back a portion of a conversation for you. We need you to work some magic on what was said."

Fred shook his head and shrugged in a resigned manner, obviously not hopeful. "OK, come with me." He stalked off muttering under his breath about gate filters and random shot noise.

I didn't think he meant the guns.

It took the better part of two hours, but Fred managed to do what needed to be done. After I had replayed what I could remember of the conversation, complete with Martin and Pete's voices in the background, he sat and stared at me for a full minute. Then he grunted and made me go through the complete performance again, this time into a microphone. Again he stared at me. "Is that accurate?" he asked Pete.

"Enough so to give me goose bumps," Pete admitted.

"Jesus . . ." he whispered.

He turned to his work, playing the

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recording again and again, adding and subtracting minute amounts of electronic filtration and noise reduction. As he worked, he kept looking back over his shoulder at me and mumbling to himself.

In the end, he managed to make the conversation intelligible, except for one place where the ether had actually splashed against the door to the office, obscuring what they were saying. Fred said that the noise floor was too high, but turned and apologized to me, saying that it wasn't my fault.

One last time, he ran the tape through for our benefit, as he had been using headphones and we had not been able to hear.

We were out the door before the tape finished.

This time there would be no mistakes. Half of the police force was hidden in the shrubbery around the house on the lake front site. There were helicopters and powerboats standing by just out of earshot in case anyone should try to get away by water. The roads had been sealed off.

Pete, Martin, and I went to the front door. There was no answer to the bell. Fortunately, the door wasn't locked, although I was prepared to do my duty if necessary.

We entered carefully. The house was quiet. If anyone was home, they were keeping a very low profile.

We went from room to room, but found no one. Finally we reached the living room, which faced out onto the lake. As we skirted the end of a long wooden bar a man stood from behind a couch at the other end of the room and leveled a machine pistol.

He wasn't fast enough for Pete.

Pete's service revolver swept up of its own accord, centered on the man's sternum, and exploded. The man's gun swung wide as he fell and caught the arm of the second man as he stood and tried to take aim.

Pete's gun fired again. Not as accurately, this time, but enough. The second man's shoulder erupted in blood.

By this time, Martin had his gun cocked and steadied with his other hand. The survivor dropped his gun over the couch on the floor. "For some reason, I'm having a *deja-vu*. I feel as though I've seen these two before," he said.

Pete made no reply. "Where is he?" he barked at the man behind the couch.

The man spat an obscenity. Pete only nodded. "I see."

Martin and I slipped behind Pete and began to search the room. Martin opened a door near where we had been standing. The man we were seeking was standing just inside the small office. He bolted towards the sliding glass door leading out to the lake.

I was between him and the door, but I'm not strong enough to catch and hold a full grown human being. As he sprinted past, I shot out my tongue and looped it between his legs. It felt as though my tongue would be torn out by the roots, but it was enough. He tripped just as Martin's gun fired. The bullet missed the man as he fell and shattered the glass in the door.

Pete nodded to me. "Good work, Victor. Now we've got him alive."

The man quit struggling as Martin stood above him, gun aimed squarely

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at his head. "I'd be still if I were you. You're not one of my favorite people right now, and I won't miss again."

One last time we were gathered at Pete's desk. Three or four other officers and Marie stood behind us as Pete related what he knew.

"His name is Horacio Faran. Nationality unknown, but we do know that he was educated at Oxford. Within the next day or two, we should have copies of their records. Then we will be able to trace further back."

"Dispense with Mister Faran's life story," Martin protested. "All I want to know is whether they have enough to convict him."

"Oddly enough, that should be the least of our problems. He has proved to be quite talkative—admitted to everything. Kinda like when he was talking with us. Part braggart, part doesn't care what the rest of us think. I gather that he thinks he's better than the rest of us and just doesn't feel as though our opinions really matter."

Martin exhaled noisily. "Brilliant but sick, huh?"

"That's about the size of it," Pete said.

"I'd say this consulting fee we're getting was well earned," Martin said, "but do me a favor. Don't call Victor and me the next time you get stuck. I've had about all the excitement that I can stand for the time being."

Pete cleared his throat. "That reminds me. I was able to make a good case for a higher rate of pay than we originally agreed upon. No one expected that it would get quite as rough as it did. In addition to that, we're indebted to Victor for bringing down Faran . . . uh, single-tonguedly."

Martin groaned, but Marie picked up my hand in the manner of a referee at a boxing match. "The winner!" she exclaimed.

"No," I corrected her. "The *Victor!*" ■

●Whoever kindles the flames of intolerance is lighting a fire underneath his own home.

Harold E. Stassen

●Problems are only opportunities in work clothes.

Henry J. Kaiser

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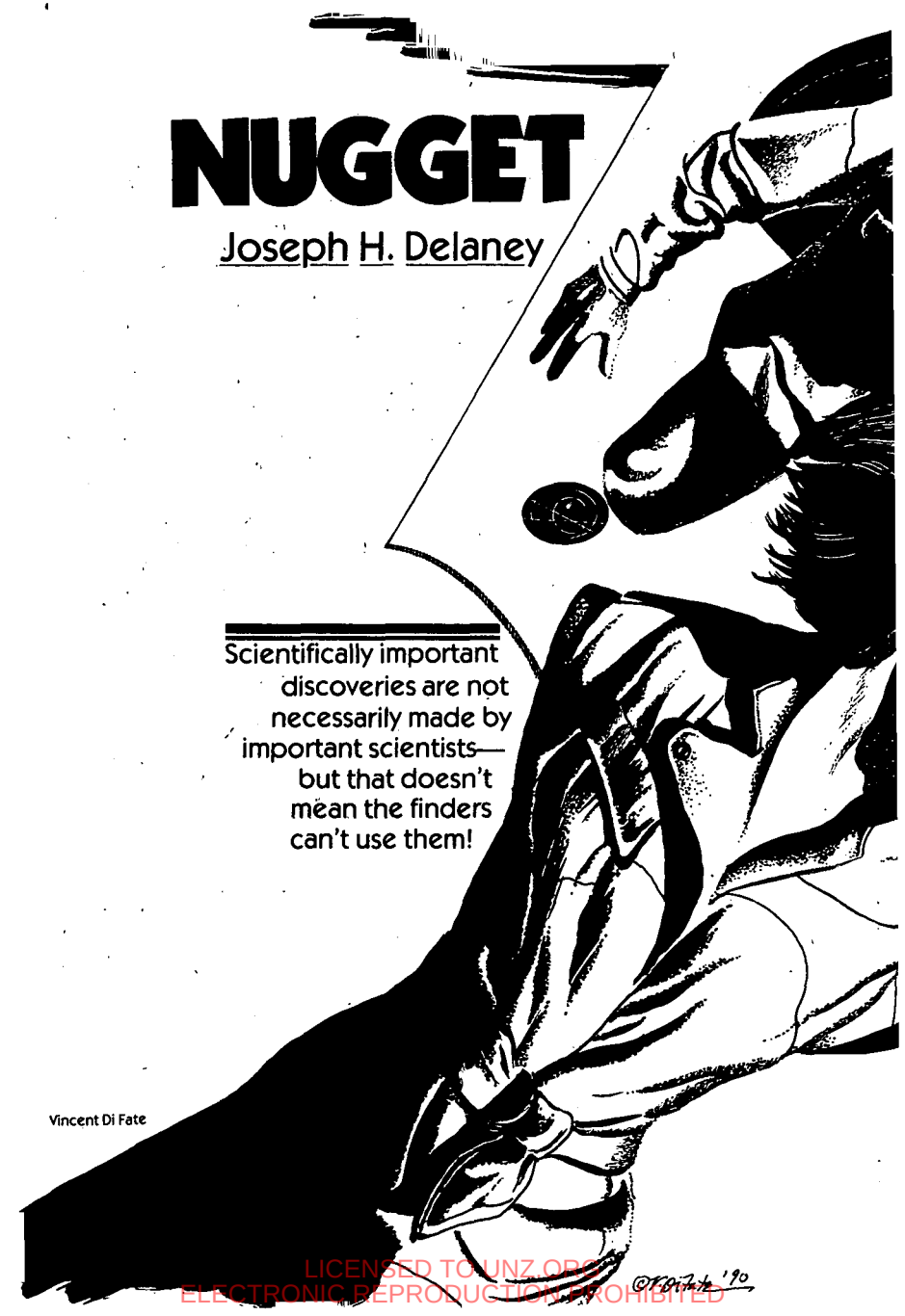
NUGGET

Joseph H. Delaney



Scientifically important discoveries are not necessarily made by important scientists—but that doesn't mean the finders can't use them!

Vincent Di Fate

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Leaping Flea, mostly engines and fuel tanks, was such a small vessel that she did not have private quarters, so that there was no place aboard her where the barest whisper could not be heard from any other place.

Barbara Seville had the watch. Bored stiff while her companions snored away, she gazed dull-eyed at the display of the forward looking radars, every few seconds diverting her attention to the other screens to check for changes there.

None of this was actually necessary to prevent collision; the computer could predict such events long before a human being could calculate the trajectory of any body large enough to imperil the ship.

But the computer had no curiousity and couldn't do what *Flea's* crew was out here to do—to find valuable chunks of matter among the gobs of worthless detritus that floated by. The big outfits, with their automatic collectors, gathered the iron-nickel and other mundane minerals. In the quantities they harvested, even troilite had value, but *Flea* had been designed to hunt volatiles, the most valuable commodity the belt contained.

Volatiles were also the scarcest, so the inner belt had been picked over pretty well, and the outer belt, where Solar Iron and Minerals reigned supreme, was a risky place to take a little ship like *Flea*.

This was not just because of natural perils either. As big and powerful as Solar was, it was still jealous of the minute amount of wealth that marginal operators took from what it regarded as its turf.

Solar, super-aggressive and super-ruthless, was the alter ego of Jacob Rothstein, known to his contemporaries as the Ganeph. The word meant "thief," and they had hung this nickname on him back in the free-wheeling days when human exploitation of the system was just getting started, when Rothstein had reputedly looted the Israeli treasury to get his start-up capital.

Whether that story was true or not there were other things about him which were more certain—that he was absolutely unforgiving, that if he continued unchecked, some day Solar would have the out-system mining operation all to itself, because the Ganeph alone was big enough and wealthy enough to make the next logical move and plunder the riches of the Oort cloud.

A fuzziness appeared on the screen and caught Barbara's eye immediately. Fuzziness usually, but not always, indicated a cluster of small objects that were physically unconnected, and which the radars tried to resolve but couldn't. But it could also be the result of irregularities in the reflective properties of target materials, so optical examination was de riguer. Many times such reflections turned out to be from volatiles, usually water ice, but sometimes methane or ammonia. Also, many times the quantities of these substances were quite small and existed only as a sort of cement that held the conglomeration together.

There was a way to tell. Barbara made her preparations. At the flick of a switch the ship's laser control dropped down and a plot of the target appeared on her right auxiliary screen.

The range was not very great, and if

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this did turn out to be a worthwhile find *Flea* could stay on it with very little expenditure of reaction mass. That was fortunate, since it meant that there would not be any need to share with other vessels, no need for help to head the thing off. *Flea* could hog it all up.

Carefully, Barbara curled a toe around the trigger, and fired the laser, which struck the mass at its center and liberated a wisp of vapor. Then she turned her attention immediately back to the auxiliary screen, which had now split, half of it maintaining the target display, the other half now devoted to spectrography. Barbara's heart jumped up her throat. She screamed it out at the top of her lungs—"WATER!"

The response was two thuds. The one from the corner of the control room was followed by a groan. Pickle Williams was always cold, therefore when he slept he liked to cozy up to the cabin lights above the reactor console, but in such cramped quarters there were always risks, especially if you couldn't see.

He rubbed his aching head with one thin hand and unsnapped his tether with the other, rolling through the cabin air, barely escaping collision with Bart Katz, the third member of the crew. Bart was at the opposite end of the hot-cold spectrum, and favored the airlock for sleeping.

Nobody said a word. They all hovered before the screen, where the image struggled to grow and resolve into an identifiable configuration, and waited for the machine to announce its conclusions. Once the computer had the data it needed it began an analysis. It printed with agonizing slowness at the bottom of the screen until Barbara thumped the audio button with her chin. Then the machine began to read its own dry words in a monotonous, synthesized voice.

"C'mon!" Williams urged it, as though this would help. "Tell us how much."

It didn't, but Barbara tried her best to make a guess from the data she had seen. She was optimistic, "Lots," she beamed, "providing it's a solid iceberg, though I'm pretty sure it isn't. But there's maybe enough to make this voyage profitable even if half the mass turns out to be pure junk."

Williams grunted. The computer had determined the thing's mean diameter now, 168 meters, but hadn't yet been able to calculate its mass despite the ultra-sensitive instrumentation from which it was drawing its data. That was odd. They were within thirteen kilometers of it and by now there should have been a minute but measurable gravitational attraction acting on *Flea*, small as both masses were.

They huddled in silence while the engines burned a course correction that would take *Flea* into intercept trajectory. They would approach it from astern, overtake it slowly, and thus have plenty of opportunity to study it from a distance.

Half an hour passed. Except for the computer's synthesized but muted voice, which continued to rattle off data, silence prevailed. It was though each acknowledged his own pipe dream was being duplicated in the imagination of each of his companions, and such dreams being fragile things, none wanted to spoil this for himself or the others.

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If this *was* the nugget every small independent operator dreamed about they were fortunate indeed. Such events were rare, even for big outfits like Solar, which had resources enough to really comb space and operated with a thousand times the efficiency of the so-called ethnics.

"Ethnics" was a misnomer. The term and the rationale for establishing this space mining category were borrowed from the old US civil rights legislation. A certain number of all the out-system mining licenses had to go to recognizable minority groups, that was the law.

The legislature had regarded this statute as a social mechanism when they enacted it, but to the big operators it was just a nuisance, and while they had to live with the idea, and pay lip service to it, space was a big place and almost impossibly hard to police. They managed to get their licks in and because they did the ethnics were evermore a dying breed, and this noble idea's time had come, and gone.

Thus the ranks of the minority operators dwindled, because even with the extra boost they got, an enterprise still had to be profitable to stay in business. *Flea's* operation was typical, generally wasn't and maybe never would be profitable, and her crew was not only always broke but up to their ears in debt. The only saving factor was that the creditor who staked them was the same benevolent government that granted the crew their license to begin with. They could count on the government to forbear a little longer than a commercial bank could—a little, but not much longer. On this voyage or the next one at the very latest, *Flea* would have to hit pay dirt or check out.

There came a welcome interruption to the boredom; a quantitative mass figure finally appeared on the screen, though the computer warned it was only an approximation and that more data was needed. This figure was greeted by three incredulous gasps.

"Couldn't be," Katz growled. "Even hollow, that's just not possible."

Katz had cause to suspect there might be vast empty cavities in the chunk. Such tunnel-riddled bodies had been seen before, the most famous being Carcomido, which some experts suspected was not natural and whose location had since been lost along with its discoverer, Gonzalo Reyes. But Carcomido had been far out in the cloud, while this was barely 2,500 light-seconds from home. Also, Carcomido had been mostly nickel-iron and not, as they supposed this was, a cometary core.

Speculation ended when the target got close enough so *Flea's* optics gave a detailed view. It did seem to be riddled with tunnels, it looked almost worm-eaten.

From then on nobody seemed to care anymore whose watch it was. The three took turns preparing refreshments, eating, drinking, and speculating as they gaped at the instruments, checking and rechecking, actually hoping to find malfunctions.

When the distance had closed to less than a kilometer, and the thing loomed big and bright ahead, they learned the truth—there was a lot of water but not enough to make them rich. The current voyage would be extremely profitable

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but they'd still have to keep on searching for that big strike.

"Know what it looks like to me?" Katz mumbled, "like a string of pearls gathered up in a pile, fused together, or maybe one of those Chinese ivory carvings, with all the lacy balls inside each other. I've got to get in there and take a look."

"We'll give you the chance," Williams replied. "Barb's watch was over an hour ago and you're on now. You can go out whenever you like."

"Before we dock?" Katz sounded a little scared.

"We need a nice thick area, and the best way to find that would be an EVA." Barb smiled at him and pointed to the rack next to the lock where their suits were tethered.

Katz did not reply. He pushed off from the control panel and snatched his up as he floated by. It was the one without legs—Katz didn't have any.

There was another one without arms, but equipped with special pincer devices at the toes and a peculiar cranelike appendage protruding from the helmet. That one was Barb's. Even the one that looked almost normal wasn't. Williams's helmet lacked the usual transparent faceplate, something of little use to a blind man.

This was the basis of their claim to minority status. Out here in space, so long as they were reasonably careful, these handicaps weren't nearly as awkward as they would have been within a gravitational field.

". . . big dull-looking white balls, mostly," Katz droned over the suit-to-ship channel. "The colors get brighter as size decreases, and just like I said, the big ones look like a string of pearls. The largest ones are about the size of an automobile and they seem to go down from there, maybe to microscopic size, who knows?

"Some places the ice coats them very thinly, and looks almost like a real string. Other places are translucent, milky looking, like maybe the material is a frozen slurry. I can see a couple of places where spheres must have broken loose and drifted off, leaving a cast in the ice. This helps create the tunnel illusion, that plus the fact that there are also quite a few transparent balls. I hope we can find enough fortune tellers back home to make hauling these back worthwhile."

"Cut the travelogue and give me something I can use to dock," Williams fairly screamed back.

"Not with me out here—uh-uh. Let Barb do that. Barb?"

"Don't worry about it, Bart. You're coming in beforehand no matter who does it. *You* can do it if you like. Have you found us a good solid spot yet?"

"Yeah. There's a fairly thick area over on the other side. I'll get around there and mark it with paint and set a thruster to spin it around."

"Hurry it up, then, it's way past my bedtime, I'm getting awfully sleepy."

Katz disappeared beyond the horizon and reappeared a couple of minutes later clinging to a metal object that projected from a tripod. The legs of the tripod were wedged into crevices in the object's surface, stuck fast, Katz hoped, and able to withstand the relatively gentle push the nozzle would emit. He pulled up its antenna and pushed himself

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off toward the ship, which now lay only about fifty meters away.

Another half hour was spent wrestling with the radio control that aimed the thruster, but eventually the rotation was, well, not quite stabilized, but close enough so that the difference wouldn't matter.

In the meantime Barbara did retire, leaving the two men to complete the docking, and ironically it was Williams who handled that, blind though he was. The computer supplied him with all the data he needed to make up for the shortcoming.

Thus, at the proper instant, the laser extended from *Flea*'s needle-nose like the proboscis of a mosquito, and in a short burst, burned a cylindrical cavity into the ice. An instant later the same mechanism shot out a cable, which entered the hole to a precise depth, inflated a pneumatic collar to prevent outgassing, and then, heated by a magnetic induction, melted the sides of the hole in around itself. In the final phase of the docking manuever four previously folded legs extended from *Flea*'s sides, giving her even more of the appearance of a feeding mosquito, and bracing her securely against the taut cable so that her own engines could be used to muscle the mass around.

The docking completed, the next, possibly the most dangerous phase of the voyage began: reporting the discovery to the Space Guard, making formal claim, and requesting a vector in-system. They were almost forty-three light-minutes out and a lot could happen before an acknowledgment came.

It was not the environment they now feared, but the reality that their report would almost certainly be monitored by the big guys, one or more of whom would likely have vessels in intercept position.

Most of the independents had long claimed that some of Solar's big ore carriers doubled as pirate vessels and some had tried to convert government prosecutors to that theory.

But although statistics seemed to back up such allegations, and at the scene of almost every disaster one of Solar's rigs always seemed to be in a position to salvage, the government still protested that it had insufficient evidence to justify an investigation, much less a prosecution. Real skeptics had an answer for that too, that payoffs were as big as the stakes over which these cutthroats contended.

But as is generally the case, in their excitement the reward seemed well worth the risk to the crew of the *Flea,* and they settled back to await official confirmation.

Barbara had not been able to wait out the lag, and had again retired. When she awoke *Flea* was under feeble but noticeable acceleration. She hastily unsnapped her harness and leapt to the communication station, where Williams dozed.

When he did not acknowledge her she thumped him smartly on the back of the head. "Well, did we get it?"

"Yup," Williams answered, rubbing his head. "There was a personal message for you, too; Collard says to say 'hello.' It sounds to me like he can't wait for you to get home and throw your legs around him." Williams's grin suggested he knew a little more about their

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relationship than she would have preferred.

She ignored the innuendo, extracted a coffee bulb from the freezer and popped it into the microwave, wavering awkwardly as she reached up, balanced on one foot. Under thrust, tame as it was, she was less graceful than in free-fall. She turned to Katz, who was busy at the analyzer. "Do you know what we've got yet?"

Bart paused, grunted, straightened, and adjusted the glasses he insisted on wearing instead of contacts. "As nearly as I can calculate, about 80,000 tons of water, plus."

"Plus what? And only 80,000 tons? There should be three or four times that much despite the holes."

Katz nudged his glasses again, hesitating. "I don't know what else, and the computed volume doesn't match up with the mass figures I should have gotten. I—"

"Doesn't match? It has to match, the error has to be in volume."

"I-I don't think so. The computer could handle the math easily enough even if I couldn't, and still the best it can make is an approximation—unless we assume the rest of the material hasn't got any mass."

"That," Barb answered, "is absurd." She turned to the instrument panel. The needle hovered over .08 gee. "Didn't you get any samples while you were out there?"

"Sure—sure I did. I brought in a couple of chunks of stuff, including that sample of the slurry that's melting in the tank over there. Aside from the balls the rest is the usual—a little silica, iron, sulphur and nickel concretions; trace quantities of ammonia, water and methane ice crystal holding the concretions together. Nothing new—"

"The big balls too?"

Katz's expression, a cross between bewilderment and sadness, struck Barbara as extremely odd. He was a moody person to start with and while he let every little thing stew, he seemed to prefer to suffer in silence and very seldom complained.

"All I got," he replied, "was a couple of little teeny blobs about BB size. They came from one of the little green balls, though I didn't have any way of getting pieces off the big white ones —they're all buried too deep in the mass, there was nothing within reach—"

"We don't really know what we've got, then?" The instant she said this Barbara regretted the interruption, because she then got the distinct impression Bart was working himself up to further explanations. She knew her personality was an intimidating one.

He evidently thought better of it. "N-no, I guess we don't." Katz was sweating. It took him a moment to bring himself back to reality—this was not a dragon, this was only a woman, and she didn't have any business crawling up his back.

Just as he braced himself for a counterattack with his new courage, she ruined the whole thing by changing tactics. "We really ought to get out there and find out what we've got then," she cooed. "For all we know we might be pushing the Universe's entire supply of philosopher's stone—if this is all as peculiar as you say."

"Yeah, Bart," Pickle chimed in,

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"don't be so lazy about it, doncha wanta be rich?"

"B-but we're accelerating."

"We can chop it off for as long as it takes, and make it up later. After all, we've got mass to burn now."

And that was true, *Flea*'s reactor was now feeding off their payload, saving the reaction mass in her tanks. They didn't need to be stingy with it, even if using it was the physical equivalent of burning money.

Barbara gave a sigh that said it all for everybody. "What *is* this stuff?"

There wasn't any answer. Williams, who couldn't see it, and who had been forbidden by the other two to touch it, sulked in silence. Katz was abashed because of the small "rock" samples; Barbara because she had fumbled around and lost the largest of those he had brought in.

"We-ll," she began again, "why don't we summarize what we do know—"

"Like what?" Bart snarled back. "All we know is that it's almighty hard to hold onto. We don't know anything else about it, or what uses it might have."

"A super-lubricant, maybe . . ."

"I don't think that's it, Barb. Look at your own experience—once you have a firm grip on it you're OK, it's the approach that's touchy. I collected pieces by trapping them in a dead-end tunnel and stuffing them into a sack, otherwise they would have slipped by me. That was normal enough in free-fall but now that we're underway. . . ." He paused to emit a sigh of desparation.

"Did I tell you what happened just before I came in?"

"No."

"The spot on the ball where I hit it with my hammer to knock the chips off—it healed, just like that, and—it looks to me like the chips are changing, like they're straining to assume spherical shape, like water would, like the things had surface tension." He paused, then added, "also, now the chips are blue, but the bigger ball was green."

"Those *are* unusual properties—"

"Tell me about it." Katz was upset. He was a tidy person, the kind who would have kept a neat sock drawer, if he'd had any use for socks. He didn't like unknowns. "We can't touch it with any of our reagents, we can't vaporize it so we can't see its spectra. If it has a crystalline structure at all the particles are too small for our microscope to resolve." His voice trailed off.

"Well, we do know some things," Barbara answered, trying to keep her own voice at a soothing pitch. "We know it's non-magnetic but will take an electrostatic charge, and we know it has mass even if we can't measure it, otherwise—"

"Otherwise, it doesn't obey Newton, and somewhere down the line I think we're gonna find it doesn't obey much else, either," came Bart's riposte. "There can't be any such substance, Barb, we're dreaming all this."

"Get your head out of the sand, Bart, believe what you see, that's the only test. Isn't it obvious we've stumbled across a new and unknown element?"

"This isn't the middle ages, Barb, this is the twenty-first century. If any new elements are found they'll be man-

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made, super-heavy and unstable. Judging by the way this stuff soaks up heat, I'd say it's eminently stable."

"There must be plenty of commercial uses for a substance like that," she replied, trying to sound reassuring.

"Then why sell it? Why don't we keep it?" Pickle had ended his self-imposed exile.

"What?" It was like an echo. Both Bart and Barb responded synchronously; they'd been talking, and ignoring him—but he'd been thinking.

"I said, 'let's keep it, and exploit it ourselves.' After all, we can do pretty well just by peddling the water. That ought to cover the next couple of payments on *Flea* plus bring us current on our bills. How about we hold onto this stuff until we find out what it is and what it's *really* worth? Why sell it for a song and let somebody else take the profit?"

A moment of silence followed.

"How do we know there'll be any profit?" Barb asked. "This may be the spatial equivalent of fool's gold."

"*No!* No, he's right, Barb, strange as that may sound," Katz interjected. "Whatever it is we have a lot of it, and even if it turns out to be only a scientific curiousity it could still be worth a bundle."

"We'd need to store it."

"We'll rent an orbit—or we could use La Grange storage. I'd feel better about if we did that. Uh—and we'd need security."

"Right away you're talking big money again, Bart, as though we had any," Barb sighed deeply.

"It wouldn't be the first time somebody got buck fever over something that was too big for them," Williams cautioned. "You can count on the fingers of one hand the number of discoveries that the wolves *didn't* get hold of, that the discoverers did personally exploit. Why should we let this happen to us? All we reported was an iceberg, who's gonna know we have anything else unless we tell them?"

Again, silence reigned.

Finally, Bart spoke again. "We can't barge into the refinery with this intact. Anybody who sees those balls will know immediately this cargo is different. I say let's shut down and process it right here, separate the solids from the volatiles, and—"

"You're talking about a big job, Bart, especially for three gimps like us."

"We have the equipment aboard, Barb, we've used the nets before, and—"

"Yeh, for small stuff we snared a chunk at a time. Bart, we'd have to melt them out, we might lose half the volatiles that way."

"Not if we bag the entire mass and cook them out one at a time. The volatiles will condense on the film and the balls will collect in the center. What could be simpler?"

"Practically everything," Williams added dryly. "But I agree with Bart, Barb, it's the only workable method."

"But *we're* the ones who have to do the EVA time, not you. . . ."

"I'll do my share, just like always." Pickle's tone was twinged with pain. "It's not my fault I can't see."

"All right," Barbara said, resignedly. "A poor woman has no chance alone, I see. But what do we tell Collard?"

"Why tell him anything unless he

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asks?" Williams countered, "Our relative velocity makes for pretty low contrast, he might not notice for days. Besides, it's really none of his business, he's just a traffic cop."

She grunted acknowledgement. That was true. To an outside observer they were crawling infinitely slowly. Without the slingshot effect they intended to get from Jupiter when he overtook them, they wouldn't even have enough mass in their tanks to get home. She turned to the control console keyboard and typed in the necessary commands.

It had been grueling work, hazardous work, nerve-shattering work, and Barbara was secretly very grateful when Pick's interruption gave her a short rest. But it did upset her that he wouldn't say what the "critical" malfunction was, that he insisted she and Bart both come in and check the instruments themselves.

So, when the airlock door finally dilated, and she could crack her faceplate, she screamed at him, "This better be worth it, Pickle!"

Williams was not in a pugnacious mood and didn't meet her challenge head on, as he customarily did, and as she expected. He said softly, "The computer says it has long range radar contact with another vessel."

"So what?" Barb glowered.

"It's following us, still in a slightly higher orbit, but boosting in-system at over a standard gee. It's not broadcasting any recognition signal and you know that's illegal. It's got to be the Ganeph. How long will it be before you two are finished out there?"

Barbara was furious. "Longer now than it would have been if you'd told us on the radio—"

"No use telling them we know."

"They know we know, dummy. They'd have detected our scanner signal easily—the instant it locked on. It only has to travel half as far for them to do that. Don't you know anything?"

Williams cringed. "That's only part of why I sent for you. We have to make a value judgment. Should I raise Collard and tell him or shouldn't I?"

"What?! Tell Collard what? That an unidentified vessel is chasing us? That'd sound *really* paraonid. Besides, it isn't illegal to follow somebody, we've certainly done it enough times, hoping a job would prove too tough for one ship and that we'd be able to hog in."

Williams gulped, clearing an immense frog from his throat. "I just thought it was a big coincidence, is all. . . ."

"That's what Collard would think. Now, can we get back out there and finish?"

Though he was blind the glare was fierce enough for Williams to perceive it. He said not another word, and listened with relief to the hiss of the cycling airlock.

"I hope it holds," Katz wheezed as he finished tightening the turnbuckles on *Flea*'s auxilliary anchor cables. "As it is, the computer's going to have a wild old time keeping us on course."

"It'll hold, Bart, and we only have one maneuver to complete by ourselves. After that, we'll coast in to where we can get some help. It'll be OK, you'll see."

"I still think we should have taken

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a better grip on our balls and carried the ice on the outside."

Barbara took a glance at the package through her rearview mirror and decided she was satisfied. The balls had been melted out of the mass and stored inside a plastic bag which was itself reinforced with high-tensile fiber netting and cordage. Beneath this, securely fastened by the taut cables of the ship's nose winch the reconstituted mass of volatiles was not only perfectly symetrical but available to *Flea*'s hungry engines.

And, the immense hollow sphere of ice made a very effective camouflage for their mystery material. Whoever saw it would assume they had bagged the metals and jettisoned the rocky matter, not an uncommon practice among small marginal operators with slim fuel budgets.

Barb had already browbeaten Bart's more timid personna into submission, and though Pickle hadn't yet complained she had long since decided that if he did she would simply ignore him. She was a domineering woman, she knew it, and under the circumstances she was glad. Without her strength the other two would have failed long ago.

Maybe we still will, she thought, suddenly stricken by the notion the Ganeph was posturing to ruin yet another lucky strike and wipe out still another small competitor.

The lock dilated and both the weary miners swung inside. Standing at right angles to one another each grasping a strap, Barbara with a pincer and Bart with a hand, their faces might have touched, except that she had turned her back on him. With his other hand Katz tightly gripped another sack of samples hastily gathered at random.

Once back in the cabin Barb's mood did not brighten at the news that the shadowing craft had closed the range by 15,000 kilometers.

"It's got long legs," Williams quipped, pushing the "resume course" button on the master keyboard. "One gee for six hours builds up some oof. They're gonna have to get rid of it somehow.

"They can sling it back out if they want to," Barbara replied coldly. "How long before they overfly us?"

"Computer says less than seventy-two hours, unless we match their rate in the first twenty-four. It also predicts we'd have to gobble up most of our loot to do that."

"Could be that's what they want us to do: panic. If we don't get the cargo home what's the good in finding it?"

"None," said Katz, his voice reflecting his weariness. "But I fret much more efficiently when well rested, so I'll be hitting the sack."

"And I'll join you—figuratively, that is," she replied, "in both endeavors." She turned to Williams. "Keep an eye on that other ship," she said sarcastically.

"Why didn't you wake us up, you ninny?"

"For what?" Williams screamed back at his armless antagonist, who hovered over him like a cobra, "just to get screamed at a little sooner? Besides, what could you have done that I didn't do?"

"And just what was it you did?"

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"I hailed them and demanded identification."

"And I suppose they told you everything you wanted to know?"

"Didn't hear a peep from them, but at least there'll be a record of the transmission—"

"If the Space Guard was monitoring, you mean. They seldom do." Barb paused. "But assuming they were and somebody replayed the tape right away they'd hear just the one voice and write you off as a nut, or they'd think you were high on something and hallucinating. Nobody's got the kind of time it'd take to follow up on a transmission like that. Why didn't you just call in a complaint? That would at least have gotten you a real human operator."

"You do it," Williams spat back, "you're the one with the clout."

"No!" Barb retreated to the console and studied the screens as she contemplated her answer. Finally, she had a grip on herself again. "They only have sixteen cutters. They need them all for rescue work. They don't undertake any police functions or punitive exercises, they don't have the budget for that."

"How do you know that? Pillow talk?"

"Any sap could figure that out, Williams. Sixteen cutters and this volume of space—they can't maintain more than a token presence anywhere. They spot what ships they have in problem orbits and do what they can, and trust that the miners can look after themselves."

She sighed. Sad but true. The Space Guard was merely an appendage of the mining and transport industry, an official government presence out here but not a very large or powerful one. Their vessels were hopelessly out of date and the rest of their equipment was even worse, even *Flea* had better.

Way out here, *Flea* and her pursuer would be invisible to the antique scanners aboard anything the Guard might have on station. The best they might manage would be to intercept and plot the direction of any distress signal from *Flea*'s transponder beacon.

Maybe they'd already done that. She didn't think it was likely and she didn't have any way of knowing for sure, but since the other ship hadn't answered and presumably had its beacon off to do its dirty work, the Space Guard would surely assume *Flea* was alone out here.

"They've cranked up their burn, Barb," Katz reported glumly. "From the size of the ion cloud it's got to be a gee and a half or better. The range is down to 2,500 klicks—"

"*Now* tell me they aren't after us," Williams growled.

Katz ignored him. "What are we going to do, Barb?"

"Defend ourselves, if we have to, Bart."

"Let's call Collard."

"You mean, let's *you* call Collard, don't you?"

"Whatever."

"There's time for that as a last resort, Bart, but only as a last resort. There's absolutely nothing the Space Guard can do to stop this ship from blasting us if that's what her crew means to do. The government's only viable response would be to make them sorry afterward that it happened, if—*if* we can identify them and *if* they can catch them and *if* a prosecutor will prosecute and *if* a jury will

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convict. Face it, everybody's on their own out here."

It had been almost an hour since Barb had given in and reluctantly pointed the *Flea*'s high gain antenna at the Space Guard's Earth-side syncom relay. Fortunately, at the moment the Earth was on the same side of the Sun as *Flea* was, but even that did not insure a fast enough response.

The three waited patiently, if pensively, giving the Space Guard the benefit of the doubt, assuming that there was good and sufficient reason for the delay in responding.

Meanwhile, things had become physically uncomfortable for the crew, long since spoiled by the relative ease of movement that free-fall had permitted. Simultaneously with the distress call they had begun a burn of their own, one standard gee, blasting steadily to sternward, killing orbital momentum and falling inexorably toward the Sun.

They wouldn't fall that far, of course, the Sun was ever so much harder to hit than most people imagined, but they were steadily dropping below the orbital speed of the giant Jupiter, who had already begun to visibly overtake them. He would give them a very brief taste of really high gee forces a little later on, not quite enough for a capture, of course, that wouldn't do. But once they got close enough his great gravity well would soak up *Flea*'s orbital momentum like a thirsty camel, and the ship would then go whipping around him in the opposite direction like a yo-yo with a broken string.

His influence would still be massive, of course, but not quite enough for him to get a death grip. A reckless maneuver like this had seemed the only chance they had to shake their tail off.

"Why don't they answer?" Williams wailed, finally breaking their self-imposed silence.

"There has to be a good reason," Bart reassured him. "Could be there's a flare or something, or maybe they're still checking out the data we sent them, and trying to make an identification."

"Fat chance of that. All that thing is is a big box with engines, no beacon, no numbers, no nothing. A big outfit like Solar could have built it here in space, just to raid with. They could open up their scoop and fly us right down its throat, and I betcha that's exactly what they're planning to do."

"We wouldn't fit—yet," Barb replied, "although if we keep shoveling out mass like this it won't be that way for long."

"Maybe that's the idea," Williams replied sourly, "they can put us out of business just as fast either way—by gobbling us up or forcing us to gobble it up. I say we should quit running if it isn't going to do any good anyhow. Let's close the range and shoot it out with them."

"That is the stupidest idea you've ever had. We've got one puny short-range laser and to use it we'd have to go EVA and unship the cargo. They've probably got some *real* firepower, I sure would have if I was a pirate—"

"Hey, you two, something's wrong."

Barb turned toward Katz, who had been monitoring everything while she and Williams argued. It would be just like him, she thought, to inject a crisis tone simply to end the argument. She

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was about to say just that, until she saw that his expression of consternation was just too real. "What is it?"

"Look at our simulation."

She did. "We're crabbing. How can that be?"

"Dunno," Bart grunted, stabbing keys like a maniac, running error correction routines. He kept this up for over a minute, then reported, "No good, the inputs seem to be correct, the raw data support the computer's extrapolations. Of course, there might be vital data missing. We don't know all there is to know about the Old Man's habits, and this computer's not the greatest ever built. It has its limits."

"*They're* not crabbing," she replied, pointing at the other plot.

"No, but then they're still a ways behind, and maybe not subject to the same influences—but it's plain they've noticed, and cranked up their burn trying to match our trajectory. It doesn't seem to be working very well."

"They can't catch us now?"

"Not likely," Katz answered cautiously.

"Good," Barb purred. "So how do we sit with the Old Man?"

Bart consulted another screen containing a smaller scaled plot. "Very pretty. We'll go in close, a little closer than normal and much more than I'd like, maybe graze his magnetosphere but avoid any of the rings by a wide margin because the angle's wrong. We'll zip through in fine style, I think."

"Then, why burn up any more of our profits? Cut the engines."

The next instant they were weightless again, thankful for it and far more comfortable.

But Williams seemed far from content with this development. Pugnacious by nature, he felt cheated out of the confrontation which might have vindicated his own earlier behavior. Now he wanted the second by second status of the other ship and although he could have gotten the same information from the computer, asking the other humans was much faster.

"They seem to be calling it off, Pick," Katz replied.

"They'll have a real close one with the Old Man, and they've started corrective maneuvers to avoid the Van Allen belts. But they won't be bothering us anymore, that's for sure." Bart's tone was smug.

"Speaking of radiation," he continued, "it might not be a bad idea to flip the ship and put the water between us and the particle flux. It makes a good shield and we might as well get used to it."

"I agree," Barb answered. "How about you, Pick?"

Responding favorably to her unaccustomed deference, Williams nodded. "Go ahead, Bart," he quickly answered, making it sound like an order.

Katz spent a few moments instructing the computer, then supervised the execution while the others retired. Once again the crew of the *Flea* relaxed and settled into shipboard routine, their peril and excitement past.

Or so everyone had naively assumed. The interval of complacency lasted through Bart's watch and then through Pickle's, but when it came around to Barb again, just as she had the first time, she made a discovery that changed

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everything. But now instead of shouting and waking everyone else up she first did some computations and confirmed her fears.

"We're off course," she declared to her incredulous companions when they joined her at the console. "Not by much, but by enough so that we're certain to slide into that ring unless we make corrections; that's the first problem." She paused.

"W-what's the second problem?" Katz muttered.

"Yeh, Barb, quit the pussyfooting. What's up?"

She could have done without Pickle's jibe, nevertheless Barbara struggled to be civil. She was becoming increasingly aware of her bitter side and more and more resolved to subdue it. "The second problem is that, again, either Newton's all wet or something else we can't detect is influencing *Flea*'s movements. In our present position we should be dropping into the Old Man's gravity well like a streamlined brick. Our velocity should be half again what it actually is. Something is decidedly wrong."

The others glared at her. This was not the first time they had been out here, nor the first time they had executed this particular maneuver. It was, in fact, quite a standard one, and all the miners routinely and customarily plotted orbits which tracked Jupiter and his entrainment solely because his great mass was so useful.

But it was the first time there had ever been anything more to it than feeding the astrogation program into the computer and letting it match their assigned vector.

"Let's get this situation figured out," Barb said glumly, "before it kills us."

"Are there any you haven't tried yet, Bart?"

"Sure, Barb, all the three-body situations, and the four-bodies, and the fives, and all the rest as far up as you want to go. But the fact is none of the satellites are near enough or massive enough to account for the effect. Besides, we've been through here at times when some of the big ones were close around and never had this problem. Neither did anybody else that I know of."

"Maybe the Old Man himself is acting up, or—"

"Or maybe its our *cargo?*" Williams interrupted. "Bart said it was weird stuff."

The other miners glared, but neither answered.

"Well, what else could it be?" He continued. "Those creepy balls are the difference between us now and us then. They're the difference between us and that ship that we were chased by too, the reason why we're affected and it wasn't." Pickle's smile turned smug.

But Bart wasn't easily convinced. "It's tiny—by comparison to the water, or even compared to the *Flea* herself, and certainly when compared to the Old Man."

"Yeh, but it's not the planet that's getting pushed around, it's us, a strange effect, it seems to me."

"I agree, but it doesn't take a genius to see that. Your observation isn't what I'd call brilliant."

"That isn't what I meant at all, I mean, '*strange*' strange."

Looks that matched his words fell

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without effect upon his sightless eyes but their silence told Williams the whole story. "No," he roared, "I meant strange matter. Haven't you ever heard of that?"

"Yes, I have, a crackpot notion with no experimental evidence, a hypothetical substance." Bart was the first to answer. "Also, I've heard of phlogiston, and ether, and humors and unicorns, and dragons and fairies—"

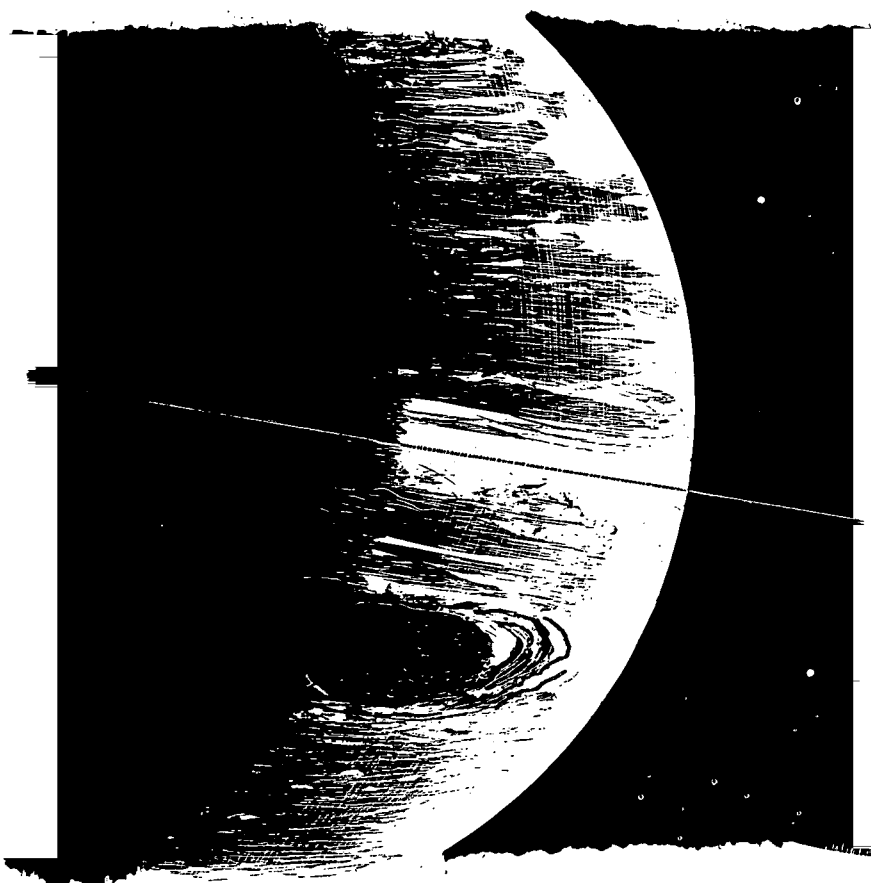
"Now, be serious, Bart. You've just admitted the impossible seems to be happening and nothing you can think of will explain it, yet you close your mind to a possible cause. There is an acid test, you know?"

"Yeh? What?"

"Cut the bag loose and see what happ—"

"No!"

"Well, why not, Bart? Is it because



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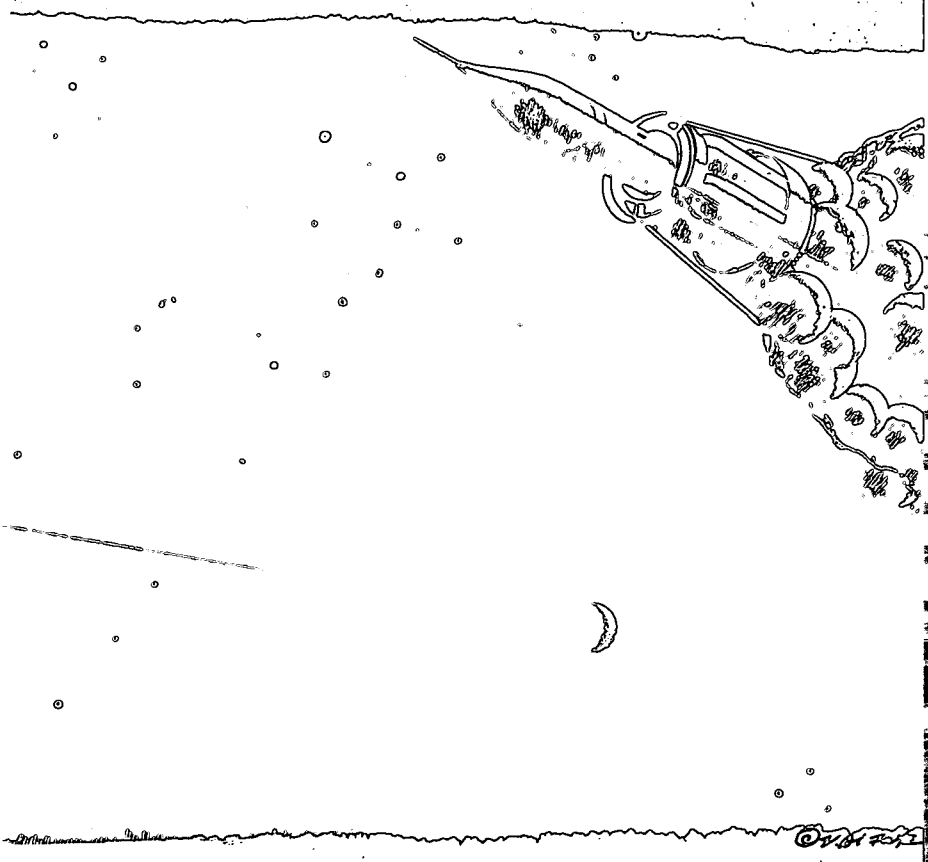
if I turn out to be right it could get away and we might not be able to catch it again?''

''He's got a point, Bart.'' Barbara had been uncharacteristically silent up until then. ''At least he's got a hypothesis and that's more than we have. Even if it turns out there's no such thing as strange matter—and there are plenty of knowledgable people who believe that's the case—you can't deny our cargo is most assuredly abnormal.''

''I don't want to be difficult,'' Katz replied, ''and I'll admit those samples we took had peculiar properties, but I think our instruments would have detected any force gross enough to affect a mass our size, and it's clear that they haven't.''

''That,'' Williams countered, ''may be because they aren't designed to do that. After all, you'd fry your hide look-



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ing for radiation with a voltmeter, but with a geiger counter you could tell right away it was there and clear out before you got hurt."

"I've—"

"I heard what you told Barb, Bart, that new elements will be man-made, but how do you know that? Who told you?"

"Well, I suppose with the Universe being as big as it is there could be stuff we haven't run into yet, but it'd be awful rare—"

"And maybe we're just awful lucky, Bart—"

Barb chose that moment to put her foot down, literally, tapping first Pickle and then Bart on the shoulder with a supple big toe. "It's not worth fighting about, guys, and we're wasting time. No matter who's right, the *Flea* does happen to be out of control and if we aren't careful *whatever* it is we've got might wind up going down the Old Man's pipe. What we have to do now is figure out some way of using the effect."

"I brought a book with me this trip," Williams replied. "It's all about black holes, strings, monopoles, quarks, and anti-matter. I'll get it." Without waiting for encouragement he rushed off to the end of the cabin, where the personal lockers were located, cracked the door and muscled out a thick volume.

"Here you go, Bart." He sent it sailing down *Flea*'s long axis.

Katz caught it easily, flipped it open and did a double take. "Wh—this is in braille!"

"So, whatcha' expect? I'm blind."

"Yeh, but I can't read it."

Barb sneaked around Katz and nudged the book out of his hand, then with one foot guided it deftly back into Pickle's grip. "As I said, 'We're wasting time.' Get to the point, Pick; tell us what it is you think we need to know and make it snappy."

"Well, I haven't gotten all the way through it yet," Williams replied sheepishly, parting the thick pages of the book and running his fingers over the page-number symbols. "But . . . ah, here it is, chapter eight, 'Strange Matter.' " He momentarily lapsed into silence, though his fingers flew and his lips moved almost imperceptibly.

"It says here," he said finally, "that stable strange elements can theoretically vary from the mass of lithium upward to infinity."

"Very profound, Williams," Barb muttered.

" 'Computational chemistry can make no precise predictions yet as to the properties of strange materials. Conceivably, atoms of such material could have up to 1,000 electrons in their shells and numbers which are equally high. It would contain strange quarks, and therefore possess strange properties, among which might be new and powerful long-range forces that would act on nearby atoms, and which might be a thousand or a million times as strong as those we are used to. Some strange elements might produce and emit gravitic radiation, or might block gravitic radiation. It might be possible to use these properties to separate gravitational mass from inertial mass—"

"Thereby making anti-gravity possible," Katz continued in Pick's place. "Now that does seem to fit our situation, doesn't it?" he said, a sheepish

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expression washing over his face. He was looking Barb straight in the eye when he said that. It was as though he'd suddenly had a revelation.

And perhaps he had. He certainly began to sound like he had. "Consider where we were when the effects first became noticeable; we were entering the leading edge of the Old Man's magnetic field. I said we'd just graze it; I was wrong, we did more than that, we started to slide around it before something stopped us, we crabbed. And, I think we must have been very lucky if Pickle turns out to be right about what we have out there, because we were not only in the weakest part of the field but we were between the Old Man and our cargo.

"The reason that's important is that unrestrained we might have followed the flux around to the pole and dropped right in. As it was, we flipped over right afterwards, eliminating that possible catastrophe and at the same time interjecting our cargo between us and the planet.

"We still have a long way to go, and now we've stopped accelerating into the gravity well. We maintain what velocity we had to start with but that's it. It's going to screw up our operation something terrible but I'll bet there'll be plenty of compensations." By then he was chuckling in anticipation. It was a side of Bart the others had never seen before.

"Easy enough to check that out, Bart," Barb said soberly, "gimbol us around again and observe the effect, set our doppler altimeter on zero and let the Old Man roll it."

"Making certain beforehand," Williams cautioned, "that we have ample room in which to correct any errors of judgment. I don't want a surface tour of Jupiter, I want to get home in good enough shape to howl with the *rest* of the rich playboys.

The others again stared blankly at Pickle. Neither one had yet considered the monetary value of humanity's only known cache of strange matter—if that was what it was.

"This is great," Katz chuckled. "All we need is the steering jets." He had plotted out all the possible newtonian reactions and adroitly nudged *Flea* around to a stern presentation. There wasn't any lag, merely an abrupt and steadily progressive shrinking of the column of mercury that formed the heart of *Flea*'s accelerometer. This was accompanied by a corresponding decrease in the distance to the theoretical point arbitrarily chosen to represent the Old Man's surface, though practical scientists still assumed he had no true surface.

"Yeh," Pickle chimed in.

Barbara was not quite so reassuring. "True only so long as you have all that mass to play with, Bart, but it's not a free lunch, so let's use it wisely while we have it. Is this trajectory going to come anywhere close to our assigned vector?"

"I can certainly make sure that it does, Barb. This is fun."

Katz thumped more keys. His reward was a full screen display of that trajectory as compared with the old course. The two weren't very far apart even then. He chose to make the final adjustments manually, hence they were a little jerky, but *Flea* wound up right on

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the money. "How's that, everybody?"

"Fine," Barb replied. And it was indeed a very neat job. She knew that she could not have done this with the ease he had and she suspected that somewhere in Bart's background there were some secrets he hadn't shared with Williams and herself.

Katz had not been born with his handicap, hadn't lived with it for his entire lifetime as they had. Barb believed this accounted for his retiring, self-effacing habits, but she had never pried. People like them had enough problems with the prurient curiosities of normals.

With *Flea* again in a stable state they relaxed in silence, albeit a very tense silence that made the cabin's air seem physically charged.

Barb broke it. "We have to talk about this, guys. We have to do it now, while there's time. We have to decide how to spring this on the world." She paused, then added, "and as Pick so aptly put it, we have to find a way to keep the big guys from taking it away from us." After that her expression turned grim.

"The government will help us with that," Bart answered.

"The government will help themselves," Pick protested. "Can't you just see us up there with the president, getting medals for generously donating this planetary treasure to the race?"

"He's right, Bart," Barb agreed. "And he's right about something else too—we've been lucky, we were in the right place at the right time and this may be the only time anything like this will ever happen in our Solar System. People have been out here nosing around for over a generation and nobody's ever come across the likes of this before. This blob might have been drifting through space since the day of creation. It might have come from clear across the galaxy, or even from some other galaxy."

She interrupted her speculations long enough to glance at her companions, hoping to assess the effect of her words. They both seemed perplexed, so she continued, "This stuff may not even be natural. Maybe some other race made it, maybe some race that's been extinct since before there even was an Earth. Maybe this is an example of what our own technology will be able to do in the far future.

"On the other hand, maybe this stuff's nothing but scrap from somebody's garbage dump, or pollutants that got away and weren't worth the effort of chasing down. In its present state only electrostatic fields seem to influence it, and they repel it.

"Neither magnetism nor gravity seems to affect it, so it's like a cloud of big neutrinos so far as normal matter is concerned, and it just goes around whatever it can't go through. If this batch hadn't been plastered together by the volatiles it surely would have dissipated long ago.

"But, whatever it is, wherever it came from, we can't count on finding more; there might not be any more of it to find."

"We could hide it again," Pickle suggested, singlemindedly, "like the old pirates hid *their* treasures."

His tone sounded a little facetious, but he otherwise seemed so serious.

Upon reflection, it began to sound sensible to her. "That might not be a bad move at that, Pick. It would gain

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us some time. What do you think, Bart?"

Katz did not reply right away. When he did his manner was very reserved. "It's worth talking about but it might not be easy to do," he said gravely.

"What's so hard about it?" Williams objected. "The best place to hide anything is where everybody can see it. All we have to do is find ourselves some worthless rock that's been picked over a whole lot and that everybody's familiar with, jam this stuff in a crack, and go our merry way until we have time to play with it some more."

"I have to disagree, Pick. I don't think that'll work with a body of any size, and with a small mass we run the risk of losing it by letting everything drift out-system. That's what our blob was doing when we came across it, you know, and we don't know what freak forces it might react with.

"I ran an extrapolation at the time of interception and I suspect Barb might be right about foreign origin. It would certainly have had to be in a peculiar orbit to be where we found it, and even at that the Old Man should have gobbled it up eons ago."

"No, I didn't know that, Bart. Anyhow, you seem to be able to handle it. You sure showed the Old Man who was boss."

"At our distance out from Jupiter the effects I anticipate wouldn't be a problem, Pick, but I think I have a few of the properties figured out better now and I'd almost bet we couldn't get this stuff down to a planetary surface no matter how much power we used. The idea came to me when we hit the edge of the Old Man's field. His is the strongest in the system, of course, aside from the Sun itself, but ours, or rather the mass's, is not exactly weak either.

"That's why *Flea* has a tail now, a long, bushy one, made up of ionized particles we took away from the Old Man. To anybody in-system with the right instrumentation we're going to look just like a comet, so you see, we can't hide the stuff because every move we make will surely be noticed by someone, probably the Ganeph.

"But that's not the only property I expect this stuff has. I did some calculations just before we made our course correction, bearing in mind what you yourself said about having proper instrumentation. It's apparent from them that the configuration of these spheres has a lot to do with the strength and focus of some very powerful short-range forces. There's a definite attraction between the collective mass of matter and the ship, a property that apparently has nothing to do with its other peculiarities. I think that in a different configuration this would be enormously more powerful."

"I don't understand."

"Neither do I, Pick," Barb added. "What are you getting at, Bart?"

"Simply this: there seems to be some peculiar topological properties to this stuff. Different sizes make for different physical powers and characteristics. Besides the changes in color I already mentioned, they display different degrees of thermal and electrical conductivity. One experiment I did seems to suggest that we could cause some specimens to lase a stream of neutrons. Also, I found that when you lower the temperature of the little blue ones just a tad

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you cut resistance by more than half, with all that this implies.

"No, I think it'd just be too dangerous for us to make any rash moves with these substances. We're not only so noticeable now that we're assured of getting caught if we try to hide them, but it's possible we'd wreck *Flea* in any attempt."

Barb had been listening and thinking at the same time. Bart was changing right before her eyes, becoming something she never suspected he could be, someone she didn't know. She could tell by bare instinct that she'd misjudged him, underestimated him. Now she believed that prying was justified. She had to connect this new Bart Katz to his own past.

"How did it happen, Bart?"

"Huh?"

"You lost your legs in an accident —that I know—but what were you before that happened?"

"I-I don't want to talk about it."

"You have to talk about it, Bart, it's important, maybe crucial to our survival. Pick and I really don't know you like we thought we did, Bart. You're holding out on us, and we're your own partners. You owe us an explanation."

"It wasn't an accident, Barb, it was deliberate."

"Deliberate!"

"It happened when I was with the Guard, on one of the few occasions when we tried really hard to get the goods on the Ganeph—"

"*You* were in the Space Guard?!"

"It's a long story. We, or rather, I, failed. Looking back on it today the whole thing strikes me as incredibly naive but at the time the small miners were all worked up over those piracy tales coming out of the belt. Anyway, I tried to infiltrate his organization."

"They're true, then—the rumors, I mean?"

"Of course they're true, but this is a far more sophisticated operation than Morgan and Blackbeard ran. They were thugs; these are robber barons, really efficient crooks who want to last and who are smart enough to spread the grease around like the old American bootleggers and drug lords did. The Ganeph took his cue from them and did the same.

"That's undoubtedly the reason I got caught before I learned anything really useful. Also, it's probably the real reason I survived. By letting me live the Ganeph got more use out of me, made me a horrible example. I'm convinced he even arranged for that Space Guard Cutter to rescue me after the beam sliced my tugbuggy, and me, in half. Its captain had to be on the take—he was embarrassingly handy."

Barbara easily conjured up a picture of the event. She had never seen it done from up close but taped recordings abounded. Using gigantic mirrors for power, the smelter vessels directed incredibly energetic lasers at the bodies the tugbuggys nudged into position, whacking them up into convenient sizes and trimming away unwanted material. They would easily do the same to flesh, of course, and cauterize the wounds they made. This was why Bart hadn't simply bled to death.

"The Guard retired me, of course," Bart continued, ending her distraction, "and discouraged me from talking about my 'accident.' I'm afraid I sort of went

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to pieces. I couldn't reconcile myself to my condition. I didn't like what I'd become.

"But most of all the experience destroyed my faith in human nature. I was like a kid who lost the Easter Bunny and Santa Claus in the same day, there just didn't seem to be any future for me or any point in going on. Nothing I had done meant anything. Nothing I could do would ever mean anything.

"I lost my legs for nothing, Barb, because I got in the way of somebody's greed, because everybody and his brother is dirty. That's the way things are, the bad guys have the situation all sewn up, because they're ruthless, and what that means to a practical man like me is that the good guys can't win. They're outnumbered, and they always will be, because the minute one turns up who won't sell out he gets killed."

Katz paused, as if to reflect on his own situation. "Or he wishes he had been," he continued. "Anyway, I went the usual route that people like us follow when something like this happens. I crawled off, found myself a hole, and settled down to sheer existence because I didn't have the guts to do anything else. Eventually, time mellowed me a little, and when I answered your ad for a partnership in the *Flea* I was in relatively good emotional shape. I always wondered why you and Pick didn't ask more questions, though."

"We were just after your money, Bart," Williams snickered. "Besides, people like us are conditioned by our handicaps; we don't like to talk about ourselves either."

Barbara was resolved to steer the conversation back to the point. "You obviously have some scientific education, Bart, what were you?"

"Nothing spectacular, Barb, and nothing that really helps much with what we found, although it fit in perfectly with my cover. My degree is in metallurgy. The Guard thought it was easier to make pilots out of scientists than the other way around."

"Whatever," Williams replied. "That makes you our expert, Bart."

"Yeh, Bart," Barbara hastened to agree. "No science exists in isolation. Besides, this stuff is going to be new to everybody. You've got as good a chance of guessing right as anybody else, certainly better that either of us, and what you don't know now you can learn."

"Maybe with the right facilities and equipment. . . ."

Katz didn't finish. His attention was diverted by the hooting from the computer's main speaker. This was a common enough sound in congested Earth-Luna orbits, but in deep space it had only happened once before since they bought *Flea*. Something approached her on a collision course, or near collision course, and *Flea*'s astrogation program was giving humans a chance to intervene before it took corrective action.

The others now readily deferred to Bart's new status so he was the one who got to the screen first. There was a plot displayed, but it was fuzzy and indistinct, full of gaps and constantly wavering.

"That's odd," Barbara quipped. "Is it a malfunction, do you think?"

"It's the tail," Katz replied glumly.

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"Whatever this is it's embedded in the ion cloud and our pulses aren't energetic enough to penetrate that very deeply — which means whatever it is is also very close. There's a remedy for that, though." He moved to the keyboard and began punching keys.

The hooting stopped and *Flea*'s steering jets began a weak burn, then she started to gimbol. The image and the plot cleared. The bottom of the screen began to cloud with data.

"No beacon," Katz muttered, "not that I really expected one. It's a bulk carrier like the one that chased us before. They must have been handy. Probably when the other one sent word they were losing us the Ganeph's people diverted everything that had any chance of waylaying us."

"You think it's him?"

"Him or somebody no better, Pick. Jovian space is the natural place for sharks to congregate, it's a spatial choke point. Everybody uses the Old Man for a brake, especially when they're loaded down like us. It's where the honey is, and where the flies come; still, it isn't necessarily the Ganeph.

"I don't think the Ganeph's got any monopoly on piracy yet, I think all the big operators do it, but they probably only hit the independents at this stage. Someday, when the time's right for a shakeout, that'll change, but meanwhile they're probably leaving each other alone."

"Small comfort to us, Bart," Barbara answered, emitting a long, low sigh. "We'd better notify the Guard, even though they can't help us—"

"Won't work, Barb. We wouldn't get through. We didn't get through last time, either."

She stared at him with her jaw slack.

He answered the question he anticipated and she hadn't asked. "It's the field, Barb, the same one responsible for our tail. It originates in our cargo and it's a powerful one. Our radar can penetrate it a short distance into the main body of the cloud, or a little farther on the periphery, but radar uses microwaves that get through easier. Ordinary radio uses longer wavelengths and these would be absorbed, or at least broken up. This is what happened to your S.O.S. When we broadcasted before we didn't know about the ion tail."

"Then the Guard doesn't know we're in trouble?"

"No. Worse, whoever's aboard that carrier had things figured out before I did. They deliberately used the cloud to cover their approach."

"They can't talk to anybody either, then," Williams observed.

"No, Pick, but they can sure close in and wolf us down that monster's throat."

"We ought to get a better image on the optical system now," Barb added, "OK if I switch it on?"

"Go ahead, Barb."

It was better, without the clutter that static had given the electronic image and which the computer couldn't completely filter out. Their pursuer was an enormous, boxlike affair without distinguishing features, dull black, devoid of any identification numbers. It was practically invisible against the background, lacking reflective surfaces except for a few viewports in a blister protruding above the gigantic pincerlike doors that

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formed its bow. Even these seemed to be fitted with some kind of shutter. Such a construction could only have one purpose.

"It isn't closing very fast, is it, Bart?"

"Fast enough, Barb. They're cool hands, whoever they are. They must certainly know we've detected them, because we maneuvered, but they keep coming."

"What have they got to be afraid of?" Williams whined. "They're big and we're little, and the only weapon we have has got our cargo in front of it."

"Their doors just cracked," Barb announced in a husky, fearful voice. "Hey, Bart, what are you doing?"

Katz had not dallied, he had acted. With deft movements of the joysticks he had begun another burn. Once again *Flea* was rolling, dragging its electronic tail behind it and presenting its cargo to the trailing monster.

"Katz, are you crazy? We should be boosting, not squatting in front of that thing."

"Boosting would take us into higher orbit—"

"Yeh, but there's no room to—"

"Yes, there is," Katz answered firmly. Now that *Flea* had completed the maneuver he fired the main engines. On the screens the monster loomed as though they had used their zoom lens, but the effect wasn't optical, it was real, and the hulk that followed had really grown. It was only a few hundred meters away when it suddenly stopped growing, and then Katz cut the engines.

"What happened, Katz? Why'd it stop?"

Williams, dependent on the conversation to follow events, was frantic. "Will somebody please tell me what's happening?" He squealed.

"It's the short-range forces I mentioned a while back, Pick. The cargo is repelling the mass of the carrier, like an opposite static electrical charge would. Only this isn't an electromagnetic effect, it's gravitational."

"How would you know that?" Barb demanded, her voice still fearful, "and if that *is* what's happening, how come it didn't happen to us when we took the balls in tow?"

"It did happen to us, Barb, but then the mass was dispersed and free to reorient, so it did, and we simply wound up at its other pole. What's more, despite the bulk, our combined mass is obviously much greater than that empty hulk and the force is strong enough at this distance so they can't come any closer."

"Uh-huh?" Williams mumbled, "So, now what?"

"They can't hurt us if they can't get to us, Pick, and while they're scratching their pointy little heads and trying to figure out went wrong we'll just back a little further downstream." Katz slapped more keys and the mains burned briefly. The carrier shrank.

Suddenly, there was a brilliant flash before the screen momentarily went blank.

Barbara screamed, immediately infecting Williams with her panic.

"What are you people doing?" he demanded.

"Relax, both of you," Katz said in

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a soothing voice. "We took a laser hit on the iceball and the cloud of steam obscured the optics. But don't worry, they can't hit *Flea* while it's behind the tow."

"Yeh, but they can shoot up the net and let our stuff loose. Bart, we gotta save that cargo. I knew putting it on the outside was a dumb idea and I toldja so at the time."

"It saved us from getting gobbled, Pick, and I don't think they'll shoot anymore, now that they've seen it does no good. Besides, they don't seem to be trying to follow us."

"He's right, Pick," Barb agreed, glancing at the screen. She was about to apologize to Katz until her peripheral vision picked up a spark, then she changed her mind. She knew what the spark was, it was a blip, the electronic image of another ship lying just outside the area of electronic pollution that now preceeded *Flea* in her still sedate plunge in-system. "But I see why they aren't following, we've got more company. Katz, look at the screen."

"More than one, too," Bart sighed as he perused it. Another blip had erupted on the far left. He grabbed a joystick and thumbed the firing button on its top, then waggled it around in a circle. Each steering engine burned briefly in turn, but their combined effect was to move the tail around in the same circle. Behind it, two more ships had been hiding, making five pursuers in all.

Again, Williams posed his simple but embarrassing question, "That pretty well proves the choke-point theory, but now what?"

"They seem to want us very badly, Pick," Bart replied. "It can't be the water. They wouldn't use all that effort for a chunk of ice this size—they collect more volatiles accidently than we do on purpose. They must know we have something else."

"But that's absurd, Katz," Barb replied, somewhat adamantly. "How could they possibly know what we have?"

"Because they might have a sample, Barb. Remember, I mentioned the casts in the ice, where it looked like balls had broken off? Maybe the Ganeph's people found one of these, noted its peculiar properties, and are out in force looking for more?"

"Yeh!" Williams added, "after the mother lode and trying to keep it hushed." He chuckled, "and meanwhile *we* get lucky and find it."

"That's the kind of thinking that scares the pants off me, Pick," Barb said quietly.

"That would fit the facts," Katz added. "This material *is* pretty hard to confine, and if it really does block gravitic radiation it could do all the things Barb mentioned a while back; it *could* literally drift from galaxy to galaxy. The only thing we've observed so far that seems to affect it is electrostatic charge, but all that does is repel it from other charged bodies. I think this mass stayed together because it was encapsulated in all that ice, perhaps since the birth of the Universe. If we hadn't intercepted it it might have gone on drifting in a more or less straight course, affected by nothing else than the curvature of space itself. We *did* get lucky."

"But how did they know we had it, Bart?"

"They probably didn't at first, Barb.

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They probably just wanted our iceball. It's big enough to make a tempting target, and certainly, it's much cheaper to steal volatiles from people like us as scooping is cheaper than mining bodies like Callisto. That crabbing maneuver we made on our approach would have told any spacewise pirate we had something else too, and that explains why their entire fleet is after us."

"Where will it get them?" Williams asked smugly. "If they can't close in how do they steal our goodies?"

"I think they'll try boarding us," Katz answered. "Spacecraft build up charges whenever they expel reaction mass, and this might be what stopped that other ship. Individual boarders wouldn't carry enough charge to be affected, but even that isn't what worries me now."

"No? W-what does?" Williams's voice was shrill, but reverent, as he waited for Bart's explanation. Katz now wore the mantle of authority aboard *Flea*, and his shipmates deferred to him. What scared Katz scared Williams even worse.

"It's the cargo they want, not the *Flea* or us, alive *or* dead, it wouldn't matter to them what happens to us. One man with an ordinary handgun could shoot so many holes in *Flea*'s hull we couldn't possibly plug them all before our air escaped. We'd survive a little while longer in our suits, of course, but that wouldn't matter, in the end they'd get—"

Barbara interrupted him, "I think they're planning something more dramatic, Bart." She gazed into a screen that displayed an enlarged projection from the optical system. "Is that what I think it is?"

Katz looked, and gulped, "Yep, it's a baloney slicer, same thing they used on me. It's still knocked down but they can have it ready for action in a few hours if they work hard enough at it."

"So we have that long to think of something?"

"Barb, that's only my assumption—"

"But what? What could we possibly do to get out of this?"

"How should I know?"

"Well, what are the options, then? You *must* have some ideas. Katz, you said you were a tugbuggy pilot, a professional good enough to get on the Ganeph's team—"

"So are those guys, Barb. They know what I know—"

"No, they don't, Bart, you said yourself that the guard picked you up because you were a scientist; those people can't possibly have the training you have."

"What does that matter, if they're good shots? And they are."

"Pick had a suggestion a while back, Bart: we could shoot it out with them."

"With what? And what will they be doing while you and I are out there trying to get the tow out of the way of our puny little laser? What's to stop somebody with a rifle from picking us off?"

"Not our *puny* little laser, Bart, our great big *bruiser* of a laser—that neutron job you talked about."

"Are you insane, Barb? I didn't say I could build one out here, I said 'what I saw suggested one *might* be possible."

"What could a thing like that do, Bart?"

Katz paused a long while before he

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replied, then did so grimly and thoughtfully. "Hack these guys up into dogmeat: but it'd take a good scientific team a long time to do that, Barb, and—no, no, even then it wouldn't work. We haven't got a power source big enough to feed it, it's useless."

"You mean you aren't even gonna try, Bart?" Pick sounded hurt. He sounded scared, too.

"These are ruthless people, Pick," Bart replied, with a note of quiet terror creeping into his tone as well. "I know what they're capable of doing and you don't. If we give them what they want maybe they'll let us go. I say cut the tow loose and boost out before they get their slicer ready, maybe that way they'll forget about us."

"Would you, Bart?"

This time Katz had to turn to face Barb, back in her dragon lady posture. His terror mounted, he didn't do well in face-to-face confrontations. He let his silence stand as his answer.

She wouldn't let it lie. "They won't, Bart. We know too much, and the secret's too valuable. If any of us got back and talked the government would have to take action, and even the Ganeph can't buck the entire planet. Bart, we're dead meat unless we save ourselves."

"Then, we've got nothing to lose by firing up and making a run for it," Williams said grimly. "We ought to be able to keep ahead of them for a little while, anyhow."

"I agree," Barb added. "I say, go for it."

"Yesss!"

"What was that, Bart?"

"Yesss!" Katz repeated, in almost a whisper. "Go ahead, burn every drop of the tow if you have to. I've got work to do."

Barbara was tethered to the flat surface of the protruding bulkhead that Katz was using for a workbench. Clamped tightly to the stainless steel surface, with suction cups, was the small centrifuge she used to collect the particles from the milky sludge that had long since melted out in the tank in their airlock. "This is yucky stuff to work with," she complained, "and tough to hang onto if you try to move it too fast."

"Just keep enough water in it to act as cement. It's the tension of the film that holds it together as well as it does. Uh, how many have you got?"

"Six. Uh, won't that mess up your routine a little? I mean, steam in the tube—"

"It won't be in there long enough to hurt anything; it's not a problem."

"Good!"

"There are plenty of other problems." He paused, and held out a chubby hand for the latest batch of guck that Barb had extracted, and chucked the spheres into the open freezer. "OK," he continued, "now for the hard part, we have to make some of the vermilion spheres."

"We have a couple already."

"Not near enough, we have to make some more. We'll crack up one of the big gray ones. They seem relatively inert, they don't emit anything obvious and they're big enough so that fission should produce the color we want in a fair percentage of tries. If that doesn't pan out then we're stuck. Either the big white ones ones or the transparent ones would be large enough, but the trans-

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parents obviously have an immensely powerful short-range attractional force, and the white ones seem to be responsible for the gravitational repulsion, which implies similar properties."

"How are we going to break them?"

"With a hammer. Oh, I'll admit, that could be a little tricky, and we'll probably lose a lot of fragments, but right now that's the only way I know how to do it. We'll just have to chase them down later, after we get out of this, *if* we get out of this, we can look for a way to fuse them back together. I'm sure that must be possible."

"Whatever you say, Bart, but I'm not too good at swinging a hammer."

"Pick can help. Let him swing, you can hold."

"That's suicidal!"

"He'll be careful, won't you, Pick?"

"Yeh," Williams replied grimly.

He sounds sincere; it's his hide too, Barb thought, and the little shudder that had washed over her quickly subsided.

His first whack was a little close, but she managed to duck away. The second was better and the third perefect. It was clear that years of living with his handicap had trained Pick to make very precisely controlled movements. Not only did his control of direction approach perfection, so did the force he applied. Before long they were turning out vermilion chips at a very gratifying rate, nearly once in five tries.

Katz watched with satisfaction, even as he rigged the rest of his apparatus. The chips took a while to contort themselves into spheres but the process was regular and they were ready long before his tube was. "That's enough," he said, after a quick count. "You can stop."

"Fine with me," Barb said with a sigh of relief.

Williams groped for a place to wedge the hammer so that it wouldn't drift around and conk anybody, then uncurled his feet from the stanchion he was using to obtain purchase. "How's it looking?"

"Better than I dared hope," Katz replied. He was testing the resistance of one of the vermilion spheres with a meter. "I think once we get these things cooled down they ought to do just fine. We'll have to test outside the ship, of course, it wouldn't do to blow any holes in our own hull."

"I want to do it."

"Impossible, Pick, you have to be able to see for this job, that's a must. Besides, Barb and I are going to need you inside to maneuver the ship."

"You can't go out there under thrust," Williams gasped incredulously.

"Sure we can," Bart replied, though somewhat weakly, "they're doing it." He motioned toward *Flea*'s stern, where her pursuers labored to ship their weapon.

"They're professionals, and they have the right equipment, and anyhow, that slicer of theirs is in sections that just have to be put together. They do that all the time. You've never tried this."

"That's why I want you at the controls, Pick. We're going to shut down briefly while I do the delicate work. You'll have to decide when it's time for us to resume the burn."

Williams did not reply, he simply nodded, not knowing whether anyone was even watching, but his glum mood lasted only a moment. He went to the console and flopped on the pilot's couch. "Ready," he said, flipping the com-

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puter's mode from keyboard to vocal.

"This is awful, Bart," Barbara complained, trailing on her tether toward *Flea*'s bow. "I have this terrible feeling we aren't going to make it."

Katz grunted. He had his own problems, more mass to muscle than she had, without the powered prosthetics she used. Barb's pincer could grasp the cable while, inchworm fashion, she moved her lower body up. "I *think* the ion tail blanks us out, Barb, but I can't be certain. Better shut up."

At first this unaccustomed bluntness in Bart Katz disturbed Barb, but then she realized it was a good sign. She had become the leader of the enterprise largely by default, because nobody else wanted the job, but she was not nearly as qualified for command as he was. Bart at least had a chance of pulling them through this, while she could not have done a thing to save them.

For the remainder of the ordeal they were both silent. When they reached the end of the cable, the spot where the anchor fired from the line-throwing mortar had buried its head in the ice; they needed to talk, and they did, very civilly, without a trace of rancor.

Again, the operation was handicapped by Barb's inability to chop, so it was Bart who hollowed out the nest for the super-conducting balls and the base for the projector. She lent what aid she could, steadying the load and lashing them both securely to the anchor.

"OK," Bart said, at last, "so far, so good, now back away."

Barb obeyed immediately, sliding back on the cable for a meter or so as she watched Bart.

He had a coil of thick, heavily insulated cable. When she was clear he began to unreel it, allowing its free end to slide across the bulge of *Flea*'s middle and out into the ion cloud. There it dangled, whipping around in the stream of plasma like some headless snake.

Barb knew what was supposed to happen next, of course, Bart had explained it, though he hadn't done so with much enthusiasm. In theory, the cable was there to bleed a static charge off the tail, from whence it would pass through a black box that in some arcane fashion Bart had contrived to control its force. Barb supposed it would do just that, and if he was correct in all his assumptions the current thus generated would flow into the vermilion balls the box was stuffed with, there to accumulate until Bart fired their weapon.

Somewhere along the way a small portion of the current would be converted into heat, which would melt the trenches in which the components rested, and anchor them by freezing when the current was shut off. Glancing over toward Bart, Barb could see this was happening now.

Long, anxious moments passed, during which neither spoke nor moved. Finally, Katz did both, then flicked on his helmet mike with a movement of his chin.

"OK, now to load. You know what to do, Barb?"

"What you told me, OK? Watch." She dropped her head toward the pouch on her chest, drew back with one of the frozen slushballs clamped in its three-pronged grip, and dropped it into the open end of the tube. Next she used her right foot to grasp a length of lighter

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plastic tubing, into which the corner of a rag had been stuffed. When she pulled the tube out the rag wadding was gone. "Done," she grunted, scrambling back down the cable.

"Gimbol, Pick. Barb, Hang on."

She did, she shuddered uncontrollably but she clung to the cable like a leech.

Momentarily, the main engines fell silent. Meanwhile, the steering thrusters filled in with a less oppressive throb, and a shrill vibration that flowed through *Flea*'s hull into the taut cable finally emerged as an eerie sound inside her helmet.

Breathlessly she waited and watched the heavens tumble, saw their antagonists far behind, haloed in rings of light, but still in hellishly dogged pursuit. Her eyes fell on the vessel that was the farthest behind, the one which bore the Ganeph's devilish weapon, the giant beamer that would hack poor little *Flea* into scrap.

That, she knew, would be Bart's first target. He would try to take it out with his first shot, *if* there was a first shot, because it represented the principal danger, and with it gone they had a better than even chance of outrunning the pursuing ships. It bothered Barb that Bart wasn't more confident than he was. The weapon looked just fine to her, and Bart evidently had the power he needed.

Barb knew hers was the confidence of the uninitiate, that a true professional saw things in much more detail, knew the shortcomings of all human devices, and what could go wrong with them.

Bart had expessed the fear that they might burn the apparatus out by feeding in too much power, since he had no way of gauging the level of energy the balls, essentially just huge capacitors, could store. He would be firing by guess, and if he guessed wrong and overloaded, this jury-rigged circuitry the jig was up for sure.

But he was game. Barb watched him sight down the tube, using a pair of ordinary binoculars which had been taped to it to search out the center of his target. She could tell when he found it because he risked a glance back at his cable.

He must have been as frightened as she when he did that and saw that the insulation was smoking, because in the next instant there was a brilliant flash far ahead. Bart had fired.

The flash, as it died down, became two fierce purple afterimages on Barb's retinas. The first was from the area where the shot stream had passed through the plasma tail and excited the ions in it, and the second originated in the ship with the baloney slicer, which had exploded in a still expanding cloud. "Bart, you got it!" she screamed.

"Yeah, not bad for a smoothbore. Now, hang on, Barb. Pick, you oaf, what's the matter with you? Burn!"

An instant later the main engines fired again, and Bart reached down to grab the cable while Barb reloaded. He hauled the flailing end out of the jetwash, where it was in danger of being melted into uselessness. Then he settled back down with his weapon and began to search for another target.

He found one, a huge, lumbering hulk fully fifty times *Flea*'s size, from the looks of her a standard ore carrier refitted for long burns. For raiding, he supposed. Again, there was a flash of incandescence, and again Bart dropped

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the end of the cable into *Flea*'s tail.

But accelerating toward one another as they were, gunner and target were moving at their combined relative velocities.

"Pick," Bart screamed, "turn us around for a stern chase. Hang on again, Barb."

She started to protest, "Why don't we go inboard now, Bart. . . ." But he ignored her and she knew why; he had to be out here to control the energy flow into the projector, to charge the accumulators to just the right level so that the stream of particles that erupted from the tube would have the oof they needed to tear through the metal and flesh alike. Bart was busy.

The maneuver completed, Pick was applying one gee again. They accelerated rapidly, though it was clear they had lost much ground and that their former antagonists were hotfooting it out of the area at something more than one gee.

Just as they passed through the rapidly dispersing cloud of debris from the wreck of the slicer she heard Bart mumble, "I can get in one more shot, at least," and saw him drop the cable again.

She dutifully loaded, then waited with bated breath for another flash, wondering all the while if the cloud they had just passed through was radioactive. She supposed it was, but she hoped their exposure had been too brief to matter. Then she heard Katz mutter a curse.

"Did you miss?"

"Yes, I missed. These makeshift sights aren't accurate for such long distances, even though it still has the killing power. We might as well go in now. Pick, cut the power."

They had a bottle, they were toasting their victory, but every hand was still trembling slightly. At first, no one spoke, though it was inevitable that the first to do so should be Williams.

"This is what I'd call a successful voyage," he chirped, taking short, quick sips. "We beat off the Ganeph and we still have our cargo, most of it anyhow. Uh, guess we used up quite a bit of the water, though."

"About fifteen tons, Pick," Barb answered. "That still leaves us plenty to sell when we get home."

"Yeh, well, we still have to do something about the other stuff," Pick added, "and I still think we ought to find a place to stash it."

"And I agree, Pick. I changed my mind." Bart tossed off the rest of his drink and put his bulb down. "I think I know just the place."

"Yeh? Where is that?"

"Donahoo's Castle."

"You're crazy, that place has been condemned. Why, it's got a crack halfway across the middle, a-and there's nothing there."

"Yeh," Bart replied tersely, "that's what I like about it, nobody else has any reason to go there, it's all plain old carbonaceous rock, no ores, no volatiles, and like you said, more cracks in it than you can shake a stick at. Nobody'll bother us there."

"Uh-huh."

"We can fix it."

"We can, huh? How?"

"With the neutron laser I'm gonna build when you guys get me the equipment I need. We can weld that sucker

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back together. I've seen the Ganeph's people do that with their slicers, using reduced power. It's a tricky operation but I think I can do it. Meanwhile, I can make do with spit and glue."

"What about Donahoo?"

"What about him? It's not his anymore, he abandoned it, and as a matter of fact, I seem to remember hearing he died a while back. Whatever, if worse comes to worse, we won't need it very long."

"Just long enough to stash this stuff, zoom into Earth-Lunar, and sell the water, huh?"

"Yes, and then when you and Barb come back you can bring me—"

"You're not planning to go with us?"

"Of course not, I have to stay and get to work on my experiments. In the time it takes you to get your part done I can have most of this figured out. No, the only delay will be the time it takes for us to make me a livable chamber, and Donahoo's already done most of the work." He smiled.

So did Barb. She had been a little girl when Donahoo started on the project, which was supposed to be the first space habitat outside Mars's orbit. Donahoo had put a lot of his own money in it, and a lot of his backer's money, and when he'd gone broke a lot of investors lost their shirts. But, she reflected, even if he had known when to quit and hadn't kept excavating until the Castle cracked, it still would never have panned out. Donahoo had anticipated a lot more mineral wealth in the immediate area than there turned out to be, and that mining companies would want a base of operations in line and in essential phase with the Old Man, Jupiter. She turned to Bart and nodded her approval.

"Now remember, Barb, the story is I transshipped to get home sooner and have some emergency medical treatment; that'll explain my absence if anybody gets curious. Have you got the list I gave you?"

"I coded it and put it in *Flea*'s computer. I don't understand what half of the stuff is for."

"You don't have to, I do, and I need it. When you get back here we can start preparations for our grand opening."

"I hope you're still here when we do," Barb said grimly. "That patch job might not hold, you said so yourself."

"I wouldn't be staying here if I didn't think it would," Katz answered. "Now, will you get out of here? I have work to do."

He watched them leave, and as *Flea* backed out of the tunnel sleeker than when she had arrived he, too, began to entertain doubts. But he was committed, and physically, he was both comfortable and content. Safely locked away with him, and carefully restrained, were all the particles of the conglomeration *Flea* had captured, and all the instrumentation that *Flea* could spare from her own needs to aid in his experimentation.

Katz didn't know for sure what he was going to find out about the material, but he was certain that whatever it was it would astound him, and astound humanity if its existence was ever made known to outsiders. They were still debating and deliberating about that, because they didn't know what possibilities these strange materials portended.

Katz felt safe in forecasting that if it

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really was strange matter it might someday yield great and highly beneficial secrets such as gravitational shielding, as some forms of it already seemed to promise. The critical point was that it had to be used intelligently.

Bart didn't believe that would happen if either the government or the Ganeph and his ilk got hold of what might be Sol's major supply. Instead, he and his colleagues were determined that there should be a new force in interplanetary space, which wouldn't abuse the discovery.

He sighed, and in the Castle's minute gravity he turned to begin his work. He had a lot to do. By the time Barb and Pickle got back he intended to have a dozen or more practical uses for the material and a hundred more experiments set up to find even better uses than the mere obvious. The equipment they would be bringing back would help immensely but it would have been useless without the idea. It was the idea that was important.

The idea was that the ethnics needed protection from predatory mining interests and now the *Flea* and her crew were in a position to give it to them. Word would be passed among the rest of the ethnics that they no longer had to kowtow to the Ganeph, that for a small fee *Flea* would ride shotgun on every voyage.

That was quite literally true. With the enormous magnetic field the superconducting spheres could sustain, and the titanic charge their supercapacitors dumped into their "buckshot," it left the muzzle of the launching tube at over 60 KPS, spreading in a circular pattern of about a meter per 100 kilometers. The best rifles had muzzle velocities of perhaps 1,200 MPS and were toys by comparison.

That should shake the pecking order up a little, he chuckled. With a horde of ethnics out there nosing around, picking at little objects the bigger interests couldn't bother with, the chances were good that it would be an ethnic who found the next cache of whatever this was, and meanwhile, law and order would have come to space. Katz put on his glasses, fumbled around for his lab apron and rubber gloves, and set out on the first experiment.

"Sounds like kind of a fancy name for a prospector, ma'am, and reregistry is not exactly cheap. What's wrong with the old name?"

"Nothing—for a prospector," Barb replied. "But it's wrong for our new enterprises, it'd be bad for our image."

"Right, well, you're the boss," the man said, whacking his thumb down on the enter key. On the printer next to the console there was a click, and abruptly it burped out a new certificate of registry. He examined it a moment, as if suspicious of anything that could do the job that fast, but pronounced it perfect and handed it to Barb. "There you go, good luck to you and the—the *Spacehound*."

"Thank you," Barb replied, smiling. She turned to Pick. "Now for the rest of the shopping," she said.

"The guy's right," Williams muttered. "We're going to get laughs when we boost out, you watch and see."

"Yeh, Pick," she agreed. "But not for long." ■

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the reference library

By Tom Easton

After Magic, Bruce Boston, The Eotu Group (1810 West State #115, Boise, ID 83702), $5.00, 56 pp.
The Hollow Earth, Rudy Rucker, Morrow, $17.95, 278 pp.
The Eternal Enemy, Michael Berlyn, Morrow, $19.95, 323 pp.
Polar City Blues, Katharine Kerr, Bantam, $4.50, 262 pp.
In Between Dragons, Michael Kandel, Bantam, $3.95, 181 pp.
The Planet Beyond, Steve Mudd, Questar, $?, ? pp.
N-Space, Larry Niven, TOR, $19.95, 509 + viii pp.
Her Smoke Rose Up Forever, James Tiptree, Jr., Arkham House, $25.95, 520 + xvi pp.
V for Vendetta, Alan Moore and David Lloyd, Warner, $14.95, 286 pp.
Understanding Contemporary American Science Fiction, Thomas D. Clareson, University of South Carolina Press (Columbia, SC 29208), $22.95, 300 pp.
Understanding Ursula K. Le Guin, Elizabeth Cummins, University of South Carolina Press (Columbia, SC 29208), $22.95, 216 pp.
Books on Disk

Bruce Boston has won the Rhysling Award for Speculative Poetry, the Best Small Press Poet award, and the Pushcart Prize for fiction. It is thus worthy of some remark when a new piece of his work appears. The one in question is **After Magic**, a novelette or short novella in the guise of a small book, really a pamphlet or chapbook. It concerns two seekers after magic, Stefphan Yarrow, a circus magician, and Madame Tutoni, a medium. Yarrow feels the lack of real magic behind his pretenses and abandons the circus to roam the world, finally winding up beside a Himalayan guru, Sri Rhomboid. Madame Tutoni has real talents, but they are not under her conscious control. She therefore stages her seances and revelations with the aid of a dwarf, a mon-

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key, and Laslo Strand, her major domo and sometime lover.

In due time their lives reach separate cusps. Yarrow, having mastered serenity, is stretching his consciousness toward the stars. Madame Tutoni, having achieved wealth and an English country manor whose gardens abound in flowers ending in "-a" (gardenias, camellias, etc.), is summoning the spirits to impress a duchess. Lo and behold, instead of a spirit, she seizes Yarrow's out-of-body consciousness and materializes it within her chamber. He is upset and threatens to expose the Madame for the fraud she is. She banishes her clients. Monkey and dwarf flee. She tries to unsummon Yarrow but fails. Together they embark on a search for a method of exorcism, and in the search they grow close. In due time . . .

I must stop there, for it would be easy to say too much and you should be free to discover Boston's whimsical sense of humor and fancy for yourself. The tale, neither long nor complex, is a delightful poke at a particular brand of fantasy as well as at classic delusions. It's a pleasure. Enjoy.

The Hollow Earth: The Narrative of Mason Algiers Reynolds of Virginia, Edited and with a Note by Rudy Rucker is about what you would expect from Rucker, well known for his taste for dimensional absurdities. Only he could take that hoary chestnut of a hollow Earth and justify it with an appeal to modern physics and topology.

The story begins on an 1836 Virginia farm. Young Mason Reynolds, the slave Otha, and the dog Arf (so famous that every other dog speaks his name) take the annual crop of liquid corn to Lynchburg, where Mason is diddled out of the money, steals it back, and shoots a stable boy. Boy, slave, and dog must flee. Eventually, in Richmond, Mason meets his literary idol, Edgar Allan Poe, and joins an expedition to the Antarctic, there to search for the South Hole which, says Symmes, must lead to the world within the Earth. They cross the circumpolar mountains by balloon, crash, break the ice that covers the hole, and fall to Htrae. There they meet the local savages and, after a bit of awkwardness, enjoy something of an idyll. Mason even finds true love. Later they fly across the gulf toward the Anomaly at the center of the void within the Earth, settle for a time with the telepathic Black Gods who dwell among the Umpteen Seas (huge water globs) around the Anomaly, turn black, and learn of the Great Old Ones (most like unto giant sea cucumbers) that dwell on the surface of the Anomaly itself. Finally, they salvage a derelict flying saucer and use the Anomaly to cross from Htrae to MirrorHtrae, eventually surfacing in the Bermuda Triangle of MirrorEarth. MirrorEarth, of course, is our own world, with no South Hole at all (though it is still hollow). When they reach land, they find a living MirrorPoe and tell their tale. The physics that justifies the tale comes in only in the "Editor's Note" at the very end.

It's a clever tale, and it feels likely enough. Rucker obviously did his homework, taking considerable pains to capture the temper of pre-Civil War America, the egotistical, self-indulgent character of Poe, and the gravitational peculiarities of the inner Earth. Yet one of the touches that tickled me best should probably count as anachronism: Rucker's is a modern sensibility, and he gives the slave Otha a very modern ability to sass his "master."

Michael Berlyn's **The Eternal Enemy** ranges over many years and parsecs

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and worlds, offers personal and cosmic crises galore, threatens genocide four times over, and finally achieves . . .

What does it achieve? A cosmically pissed-off reader, that's what. *The Eternal Enemy* offers an idiot plot (meaning that if the characters weren't idiots, they would solve their problems immediately, without spending hundreds of pages running around like headless chickens). This is especially annoying because the author gives his characters superhuman powers. Just as bad, and perhaps worse, the author's bafflegab seems to reflect his own bafflement by the nature of the universe rather than any premediated effort to wow his readers (consider a ship's control room in which the ship's officers face "the four quarters of space," quite as if space were not three-dimensional, or as if screens could not show views in any direction).

I could pick on more details, but the idiot plot is quite enough of an excuse to trash the book. Here it is: NASA 2 (the extrasolar branch of the operation) has sent manned probes to several stars (why manned? duntesk). One, upon arriving at Tau Ceti, reports signs of sentient life and disappears. NASA 2 promptly recruits a crew of assorted misfits, reprograms their minds, and ships them off on the *Paladin*. They arrive, the captain goes mad and decides the pastoral natives, the Habers, are a threat to humanity.

Xenobiologist Markos objects, flees in a supersonic "screamer," crashes, and awakens in a Haber body. The Habers, you see, are masters of biotech and have no trouble recovering his mind, memory, and identity from the pulp left by the crash even though his chemistry is quite different from theirs. They explain that they are constitutionally nonviolent and cannot resist the human genocide. Yet they can seek solutions. Markos, may, in fact, be such a solution: Haber reproduction involves male, female, and a "flow-bridge" who combines the others' genetic material, modifying it in the process (this idea, of course, was "borrowed" from Octavia Butler's Xenogenesis series). Markos can function as a flow-bridge, and he can, if he will, add human aggressiveness to the Haber genetic constitution.

Markos does so, and then the Habers reveal that they are not native to this world. They come from a multi-world civilization that is under attack from ruthless mass-murderers. They cannot fight back. They can seek solutions, and this colony was set up to do just that. Now, perhaps, they have succeeded, and if Markos and the kids will step this way, please, and board the hidden ship, they can take the solution home.

The *Paladin* follows. Its crew is captured and converted to the Haber form and chemistry. And they are all off to fight the enemy, who turns out to have a genetic imperative for expansionism. Markos soon realizes that this means, since the Habers are so good at genetic manipulations, that . . .

The only real surprise is that the Habers never saw it for themselves. They're an intelligent species. They had to evolve in competition with other species. They therefore have whatever genetic component there is to aggressiveness in their genes, even if it is hidden. They claim to be utter fatalists, unwilling to fight change, but they are clearly not averse to manipulating the world around them to make it suit their likings better. The alien threat should have been quashed as soon as it arose.

But then Berlyn wouldn't have been able to write his story. I'll leave it to

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you to decide whether our world would then have been better off.

Katharine Kerr is best known for her fantasies (*Daggerspell, The Dragon Revenant, The Bristling Wood*), which I haven't looked at because they struck me as too much like generic rack-filler[1] to be worth my time. But when such a professional, experienced writer turns to SF, that can be enough to make me look. I'm always hoping that writers who cross genre and subgenre boundaries will bring something fresh and exciting to SF: That hope is fulfilled just often enough to keep me looking.

Kerr's book is **Polar City Blues,** and it's enjoyable enough. She has a deft hand with the suspense, the major characters, and the action. But she really isn't that fresh and exciting. There are nice senses of past history, social complexity, realistic alien biologies and more. But too many of the lesser characters are caricatures, and she had to blow dust off a lot of the furniture.

Polar City is located on a world of the Republic, a small multi-system society, dominated by humans, sandwiched between two larger societies, the Alliance (dominated by the alien Hoppers) and the Confederation (dominated by the carlies). The tale opens as a Polar City cop finds a carlie body in a city plaza. The carlie was part of the Cons's local embassy staff. Who killed him? And why? There is no clue, except that as the investigation proceeds more bodies turn up, all of them killed in the same gruesome way, all of them apparently chosen because they saw a clue. Since Mulligan, a local psychic, has tried to read the body for the cops and has run into a painful block, he too must be on the list.

Meanwhile, prowlers in the ruins of Polar City's early NASA-built version have found signs that someone has slaughtered a heretofore unknown alien species. Mulligan reveals a hopeless crush on Bobbie Lacey, ex-spacer, owner of a greenhouse garden that sells luxury produce to the locals, collector of information, owner of a love-sick artificial intelligence named Buddy. Lacey shows signs of being stuck on Mulligan; though she can't say anything about it. The murderer reveals that he is an Alliance agent, a psychic whose skills have been nastily perverted. The alien proves to have been contaminated with a strange microorganism that is now on the murderer, eating dead tissue, demanding food, driving the madman madder, and spreading to whomever he touches. The Alliance and the Confederation both prove to be after the alien and willing to squash the poor little Republic in order to get it.

Perhaps I didn't like it better because the book's outcome is too predictable. Love comes out on top. The murderer is nailed. The cons and 'Lies back off at the appropriate moment. The plague proves to be easily—too easily — controlled. And the aliens get all buddy-buddy with the Republic. Of course.

Michael Kandel's second novel, **In Between Dragons**, is less zany than his first (*Strange Invasion*), but only if you *don't* take it the way it's billed, as fantasy. If you take it straight, it speaks directly to the heart of anyone who is, or has ever been, a teenaged, male daydreamer and bookworm.

The protagonist is just such an individual. Call him Sherm. Whenever he's bored—in school, at home, wherever — he phases out. Sometimes he goes

[1] Daggers, spells, and dragons fill the bookstore racks far too thoroughly.

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to Mr. McGulvey's library. Sometimes he is off to the city of Cuspidor, where he is a knight combating an invasion of polluting dragons. Sometimes he visits Washington, DC, where as the Perfect Psychic Master Sergeant Sherm he must fight off the invasion of an alien monster given to rearranging everyone's mental furniture. Sometimes he is Commander Sherm on the planet of New Batavia, leading the new colony through its various crises, including the Mystery of the Disappearing Food.

And as just plain Sherm, he must deal with a stressed-out mother (Daddy is long gone), a hated kid sister, acne, a tendency to blush, and girls. Not surprisingly, he is eager to learn something about the mysteries of sex. Alas, Mr. McGulvey's library is silent on the matter. He must search far and wide to find a copy of *Lust Kittens*, secrete it in a corner of the library, and consult it in secret. Alas again, the lust kittens begin to show up in his fantasies, and everything goes wrong. Polluting dragons and psychic monsters start to win. McGulvey's world develops holes. Things begin to fall apart. What can a poor boy do?

Well, for one thing, he can grow up. Kandel makes this point for his allegory without too blatant or heavy a hand, and the story is a good deal of fun. Unfortunately, I didn't find it quite fun enough. *In Between Dragons* gets off to a very entertaining start, but the joke is clear fairly soon, and thereafter it wears thin rather too quickly. Kandel is zany and clever, but his stories strike me as rather less meaty than even short novels should be. I suspect his books would benefit immensely if he could slim them down to novelette length. They would then have much more impact, perhaps even enough to make a prize ballot or two.

* * *

Steve Mudd's *Tangled Webs* introduced us to the Interstellar Union, an expansionistic, totalitarian society. Among the unclaimed worlds beyond the border was, he said, a world whose people can outperform cyborgs for speed and strength and whose secret agents strive to check Union abuses and to keep the tyrants away from their home.

Now Mudd shows us **The Planet Beyond**. The time is some years after *Webs*, and one of the agents we met then, Niala, is now part of the triumvirate that rules Home, one of the societies on the world of Seelzar. Another is Toria, a theocracy that bans all advanced technology. Home is high-tech, wealthy, and dependent on the Wells, relics of long-gone aliens; the Wells emit a green light which, if one but bathes in it periodically, prolongs life and boosts strength, speed, and general vigor; it is the Wells that account for the superhuman qualities of Home's agents in the Union.

Meet Alyssa, whose brother Darrin has inexplicably committed a crime for which the triumvirate has banished him from the Wells. He will age as quickly as a normal human and die. Meet M'Briti Ubu, who peddles the violently addictive drug Purple Heaven, which kills most of its victims within a year. She is a pusher because the drug claimed her own brother; she hopes to infiltrate the drug organization and somehow bring her brother's killers to justice.

Wishing to get her brother reinstated in Home's good graces and longevity, Alyssa goes to old friend Bashir Arak, who later dives into the heart of the semi-organic computer that runs Home, tries to tap the Forbidden Files, sealed by Home's founders long ago, and awakens a defense that nearly kills him, destroys his home, and blacks out Home

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itself. Later Alyssa finds him with a Torian friend deep beneath the city, in alien-dug tunnels no one else has ever seen. When he heals, the trio departs Home for the Torian capital. Bashir has the idea, gained from the Forbidden Files, that the main Torian temple may house a relic that could help in the effort to rehabilitate Darrin.

Meanwhile, Darrin has met M'Briti. M'Briti has found that when Home is blacked out her craving for the drug stops. The two fall in love. Darrin reveals that his banishment is a ruse managed by one member of the ruling triumvirate to permit him to try to infiltrate the same drug outfit that is M'Briti's target. They join forces and manage to entice the one person most responsible for Purple Heaven to a lonely rendezvous.

Meanwhile again, off-world agents have been captured and there is no hope of military intervention. Seezlar seems doomed to discovery. Niala, ex-agent and hence sympathetic to the captives' plight, decides to attempt a single-handed rescue mission. The Bashir trio reaches the Torian capital, successfully infiltrates the temple, finds the relic, discovers it is a fake, and is captured.

And the book stops. There *has* to be at least one sequel coming. Only thus can we learn the nature of the connection between Home's computer and Purple Heaven, the reason why Bashir Arak seems so old, what happened to Home's founders, why the Forbidden Files are forbidden and so draconianly protected, the true nature of the alien technology, and the outcome of Niala's mission.

It isn't really fair, is it? Trilogies are far more acceptable when the individual volumes achieve enough closure to stand on their own as novels. When they don't—call it trilogorrhea.

* * *

Larry Niven's **N-Space** collects short stories, samples from novels, assorted reminiscences, and miscellaneous reflections for your pleasure. It even has "Man of Steel, Woman of Kleenex," a delightful jape that tells you just what would be necessary if Superman and Lois Lane were ever *really,* to get it on together. There are also two previously uncollected stories: "Kiteman" takes us back to the realm of *Smoke Ring* and *Integral Trees*. "Brenda" concerns an aftermath of the Sauron war (*Mote in God's Eye*). Enjoy.

Her Smoke Rose Up Forever should strike you as the definitive James Tiptree, Jr., collection. In his introduction, John Clute calls Tiptree (or Alice Sheldon) "possibly the darkest writer ever to publish science fiction of the first rank," as well as one of the best. The book proves his point eighteen times over and is an essential addition to every reader's library.

And now! Once more! It's comics time! Warner Books keeps bringing out the "graphic novels," and some of them are pretty good. The latest to arrive on my desk is **V for Vendetta,** by Alan Moore and David Lloyd. It first appeared in England, beginning in the early '80s, and now you have a chance to enjoy it too.

The authors avoided comics formalisms such as thought balloons and captions, telling their tale quite successfully with little more than pictures and dialog. That tale deals with a fascist England arisen from the rigors of a mild nuclear war. Wogs, queers, and liberals have all disappeared in concentration camps. The survivors, even the party higher-ups, are routinely brutalized. Cameras and microphones are everywhere. The

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news is managed. Freedom, justice, and independent thought are forgotten.

But here is V! Masked, cone-hatted, caped, a Guy Fawkes figure blowing up Parliament, the Old Bailey, and more. Attacking the fascist tyranny, forcing it to stumble and fall, stimulating the people to grasp their freedom once more. A classic theme, but well told. I enjoyed the book.

For some time, the University of South Carolina Press has been publishing an "Understanding Contemporary American Literature" series of "guides or companions for students as well as good nonacademic readers" to provide "instruction in how to read certain contemporary writers—identifying and explicating their material, themes, use of language, point of view, structures, symbolism, and responses to experience" and to "prepare the reader for more profitable literary experiences." The most recent pair of entries in the series deal with science fiction and therefore deserve mention here.

The first is Thomas D. Clareson's **Understanding Contemporary American Science Fiction: The Formative Period, 1926–1970.** It devotes one chapter each to "1926–1950: The Flowering of a Tradition"; "The 1950s: Decade of Transition"; "The Early 1960s: Cul-de-Sac"; and "The Late 1960s: Revolt and Innovation." Clareson has restricted himself to "novels published in book form" that "writers and editors have praised for their influence" or "have received some award" and that therefore amount to "the established canon of the field." His analyses focus less on plot summaries than on issues and themes that have emerged from the tempers of the times. One major effort is to support the claim that SF has "provided the cutting edge of social and political criticism and satire." He thus emphasizes the wealth of SF that deals with nuclear holocaust and dystopias as he works his way toward the rich diversity that emerged from the sixties.

His concluding comment is worth quoting: "To the degree that its writers escaped the conviction that they must draw the blueprints of heaven or hell, they found in SF the literary vehicle which has the greatest freedom to create metaphors that speak of the nature and experience of humanity. Free of the restraints imposed by social and psychological realism, though it may use them as its tools, science fiction is able to create imaginary worlds, to distort time and space, as it seeks to expand humanity's perception of itself."

The second University of South Carolina Press item is Elizabeth Cummins's **Understanding Ursula K. Le Guin.** Cummins breaks Le Guin's work into four segments, the tales of Earthsea, the Hainish future (e.g., *The Dispossessed*), Orsinia, and the West Coast (*The Lathe of Heaven, Always Coming Home*). Her analyses point to Le Guin's avoidance of direct, thrusting, male patterns in favor of circling, spiral, feminine patterns and her stress on the key concepts of integration, integrity, and fidelity. Le Guin, says Cummins, has in her work been developing a feminist revision of social reality, a prescription, if you will, for utopia. The final picture is of an intensely intellectual, self-conscious writer who yearns to shape the world for the better by, to paraphrase Clareson, expanding our perceptions of human nature and potential.

Books on Disk

I've just received a disk from N. L. (Jake) Hargrove, High Mesa Publishing, 13 Osage Drive, Los Lunas, NM

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87031. It contains copies of both the May 1990 issue of his **Computer Information Monthly News** and **Short Story Disk #1** (thus the individual, separate disks are hardly packed with material). The former is aimed at those who run and use computer Bulletin Board Systems and contains one article on electronic publishing (in addition to letters to the editor, classified ads, instructions to contributors, and other trimmings). It also has an annoying number of typos.

For $3, the short story disk gives you just three stories, all of acceptable but not exceptional quality. Michele Mauro's "Immortality Blues" concerns a world where vampires are commonplace and a mortal seeks their eternal state. Hargrove's own "Silo" is post-peace paranoia about nuclear missiles in grain silos. Ann Smathers's "El Dorado" was hard to read or evaluate because page 56 led to page 57 which led to page 56 which . . . This is a glitch possible only on computers (books can have missing pages, extra pages, and pages stuck together, but no endless loops); I'll tell Hargrove about it, and presumably he'll fix it.

Despite the glitch, however, Hargrove's approach works well. His "disktop" books are in the form of "executable" files, meaning that the book is in a sense a program. It does not exist, as it does for many other "disk-top" publishers, in a form that can be loaded into a word-processor and modified or plagiarized. Typing the book's name puts it on your screen, and navigation is smooth. There is, however, no way to mark your place as there is in IRIS.

ANADEMS

Steve and Sharon Miller's BPLAN Virtuals (Box 338, Waterville, ME 04901) has several interesting disks available already (or very soon, as I write this), including the **Disk-Top Science Fantasy Reader, Disk-Top Horror Reader**, and **Disk-Top Writer's Guide** anthologies, their own **Gnothi-Kairon** novella (set in the Space Rogues universe) and **Kinzel** collection, and a novella of my own, **Alien Resonance**. The disks are priced higher than High Mesa's at two for $9.95, one for $5 (plus $2 shipping and handling per order), but they're fuller and much of the material is by professionals (meaning people whose work you have seen in print before). To my mind, this makes them a better buy even if the price is a little more.

If you'll permit the unashamed plug—you'd Better Buy BPLAN. ■

●Nothing is more dangerous than an idea, when it's the only one we have.

Emile Auguste Chartier

●One doesn't discover new lands without consenting to lose sight of the shore for a very long time.

André Gide

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brass tacks

Dear Dr. Schmidt,

I had to laugh when I read Tom Easton's comments about the Soviet space program in the March issue. Isn't it about time that we put the Russian "lead in space" into some kind of perspective?

In my opinion, the Soviet Union stands a less than even chance of surviving into the next century. The mess they're in is fantastic. The crisis looming over the USSR is so extreme, and so complex, that it nearly defies description. Economic breakdown, national unrest, political instability and ideological bankruptcy are crumbling away the foundations of the state. And it's nothing new—these are chronic conditions. They date from the time of the Bolshevik seizure of power.

The Soviet space program has prospered up to now because the command economy of the state has accorded it a high priority. But what will happen to it when the attention of the leadership becomes focused on the urgent problem of keeping the union together? What will happen to it if the Union falls apart, or if unrest leads to a backlash?

The Soviet space program, like Soviet military power, is an anomaly in an otherwise quite backward state. It is a highly artificial presence. It exists at the margins of Soviet society. In the long run—which is surely the way in which we ought to consider space exploration and development—the Soviet program is nothing to get excited about.

I predict that the current Soviet lead will have vanished by the turn of the century. And I believe that the United States, perhaps in close cooperation with the other industrial democracies, will have begun the work of opening up the Solar System to the benefit of the race. I agree with much of Tom Easton's criticism of the US space program, but

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these problems are minor compared to those which are about to erupt in the Soviet Union.

It's going to be an interesting decade.

THOMAS M. GREGG
Mishawaka, IN

Dear Dr. Schmidt,

I very much enjoyed W. R. Thompson's "Backlash" (March 1990). I was sure that the huxloni artist was up to her eyeballs, but I figured that her motive was resentment at future machine-made junk replacing the traditional hand-made artifacts.

R. M. Zubrin's report on indigenous propellants really opened my eyes. Two points on the mission scenario; the Moon has just about enough delta-V capability to stop the spacecraft relative to Earth when it returns from Mars or Venus in a Hohmann orbit (2.9 or 2.5 km/sec delta-V respectively). Thus the aerobraking to LEO can be done in several passes, lightening the load on the heat shield. Second, even if the OTV doesn't go to Mars and return, minor maneuvers can steer it back to Earth eventually so it needn't be considered "expendable."

Actually, a long mission is hard on the crew, and since power is available I would be inclined to replace the NERVA for interplanetary propulsion with a high Isp, long duration engine like an ion rocket.

How much will the reactor irradiate the crew? In scenario 1 with CO_2, the worst case, 135 billion joules are expended, or 1.4 grams of nuclear fuel out of an inventory of at least 3 or 4 kg. Of this, 7% comes out as radiation, but almost all is absorbed in the fuel or the engine structure which, on the NERVA engine, retains all but 0.00000015 of the energy produced. Twenty-four hours after use the radiation level is one millionth of what it was during the burn.

Damage to the crew is proportional to the energy reaching them. If the crew are 20 meters from a NERVA-type reactor and on the axis, where self-shielding is best, they are just at the legal annual limit of 0.05 gray. (6 gray is fatal, and 1 gray produces somewhere between 0.01 and 0.07 cancers.) Neutrons are neglected here and some kind of additional shielding would be needed. A cylinder of borated water one meter thick in back of the reactor would shield the crew more than adequately from both neutrons and gamma rays. Its mass would be about one ton. I am surprised at the low radiation figures, but that's how the numbers come out.

Reference: Jones, R. W, "Nuclear Rocket Test Facility Shield Analysis," thesis, UCLA, 1970.

JAMES F. CARTER
3318 Beethoven Street
Los Angeles, CA 90066

Dear Dr. Schmidt,

I have a few comments on your responses to those disillusioned by science and technology (April 1990):

1. "It's worthwhile to learn, even if the process does involve making some messes that have to be cleaned up." You mention air pollution in the same paragraph—from all I've been reading, it is getting worse. Science is providing some answers, but they are not being implemented because the scientists (and politicians) bought and paid for by corporations that stand to lose from pollution control, keep fighting against control. This applies to many of our modern ills, like the bloated military and other forms of pollution. Many scientists are fighting the good fight, but many go on working for and supporting the things that hurt and kill us. People are not seeing the *solutions* science pro-

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vides, only the *problems*.

2. Sometimes science *is* "about the wrong things." The pesticide/herbicide industry has been poisoning the planet for years now with the products of scientific research.

People should blame *people*— politicians, corporations, scientists or themselves for the ills of the world, and not science. But they see what has created the wrong technology birthed from science, and many times go no further to look for a culprit. People need to start seeing more solutions put to work rather than more problems created, before they'll start trusting science again.

Thanks, as always, for a thought-provoking editorial.

DAVE GRISWOLD

Kew Gardens, NY

But . . .

1. *I suspect you're younger than I am, so you don't remember what city skies were like when soft coal burning was common. We may have made some new messes, but we've also made dramatic improvements in some old ones!*
2. *Please take another look at the distinction between science and technology. The pesticide/herbicide industry is not* science!

Dear Dr. Schmidt:

Re: the lively discussion on "democracy" (Brass Tacks, April); you rightly pointed out that most people who discuss the term can't agree on what it means. I wonder how many ever came across George Orwell's comment (in "Politics and the English Language") on that word: " . . . not only is there no agreed definition, but the attempt to make one is resisted from all sides. It is almost universally felt that when we call a country democratic we are praising it; consequently the defenders of every kind of regime claim that it is a democracy, and fear that they might have to stop using the word if it were tied down to any one meaning." No wonder we find confusion.

I was surprised that nobody came forward with an idea that Nevil Shute presented in one of his stories. Everybody got one basic vote. But individuals could add to their voting power by certain attainments: a prescribed level of education, military service, residence abroad, etc. A single person could effectively cast up to six votes in this way. There was a seventh vote, bestowed only by the Queen, for some exceptional service or contribution to society.

Nice idea. But in these times it wouldn't stand a chance; it would be considered elitist. Politicians would water down the requirements as fast as you could say, "grade inflation." Perhaps one thing this country suffers from is an excess of egalitarianism.

CHARLES H. CHANDLER

Malden, MA

Dear Dr. Schmidt:

Julie Ecklar's "Extra Ellies," (May 1990) provided a fine example of safety consciousness taken to the point of obsession. Ecklar demonstrated that much of the quality of life can be lost through an overemphasis in the *quantity* of life.*

Much as I enjoyed the beginning of the story, I found the ending to be both patronizing and offensive. Ecklar's solution for the problem of an obsessively risk-averse society was to falsify the safety statistics.

Recent history is filled with government officials and special interest groups who sought to reduce societal anxiety by falsifying safety figures. Such "optimistic" health statistics (" . . . numbers . . . nothing more," to quote one of Ecklar's characters) have done little

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to improve the lives of the residents of Love Canal in the United States, or the cities down-wind of the Chernobyl nuclear reactors in the Soviet Union. The best efforts of the tobacco industry and the elected officials from major tobacco-producing states have not improved the lives of tobacco consumers, massive advertising to the contrary.

Granted, Ecklar's story dealt with obsessive risk aversion—caution to the point of timidity. The main character, Ina Kohill, was asked to falsify the statistics which were being used to enhance that obsession. A little "fudging" of the facts could seem forgivable under such conditions.

The problem here is that a little "fudging" of government statistics seldom ends at that. (*note*: Since Kohill worked for an organization referred to as "Health and Safety," the immediate conclusion is that she worked for a government or quasi-governmental entity.) Consider the many opinions available on the size of the federal budget, each dependent on a seemingly unique form of accounting procedures. If this seems a bit far afield, consider the drop in work-related accidents reported following the drastic cuts in OSHA funding.

A government policy of lying to the public is never a good idea, no matter how small the original lie, or how noble the original cause. It is a particularly bad idea to recommend it during a census year. There can be a temptation to creatively interpret data on such demographic categories as population shift, homelessness, racial percentages, and income distribution, and to use such interpretations to support political maneuvering. The current tendency to count income increases without balancing them against inflation is an example.

There are many ways to influence societal behavior which does not require outright lying. Consider the efforts to reduce drinking and driving. Consider the annual exhortations of the fashion industry. Or the on-going debate on the effect television programming has on the social development of children.

In conclusion, I would like to remind Ecklar the reign of authoritarian regimes often begin with state suppression of the facts. (Consider Nazi Germany.) Encouraging government officials to lie for the good of society is a bit like encouraging children to eat candy for the good of their teeth. If you want to reshape society, please attempt to do so within the boundaries of the truth, or at least within a reasonably accurate statistical abstract thereof.

DAVID MEADOWS

Albany, GA

*I am reminded here of a comment made by James Michener in his novel, *The Drifters*. As best I can remember, Michener noted that Long Beach is full of people who are 67 but have decided to wait till it was safe before they did anything fun. Now it's safe—and they're 67.

The author replies. . . .

Dear Mr. Meadows,

I'm delighted you enjoyed "Extra Ellies" enough to comment on it for *Analog*.

While I don't necessarily think the fear statistics featured in "Extra Ellies" relate even slightly to very real dangers such as Love Canal and Chernobyl, I do agree that government lying is unconscionable, regardless of the motives.

"Extra Ellies" wasn't meant to be a story about societal morality, however, or even about an individual's effect on societal behavior. "Extra Ellies" was about a single person growing beyond the need to have society mindlessly tell her what was important. For Ina Kohill, the mindless obsession was fear, but it

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might just as well have been daily jogging, oat bran, or vegetarianism. Nothing's intrinsically wrong with any of these things, any more than there's something wrong with being cautious around dangerous equipment. I object, however, to the belief that people should instantly adopt any or all of these behaviors just because they are told it's in their best interest. I wanted "Extra Ellies" to say that the ability to think and choose for ourselves is what makes human beings divine—that swallowing anything (be it religion, science, or government statistics) without thought and consideration is the greatest human sin and crime.

Deneb and Reidle are terrorists. Certainly, their solution can't be expected to be perfect or even long-range. As a work of fiction, though, whether or not the alteration of government statistics has any real affect on society is not important; even if she's killed on her way to work tomorrow, Ina Kohill is saved from her own fear. Nothing and no one can take that away from her.

JULIA ECKLAR

Dear Sir:

Catching up on my back reading, I just finished Ben Bova's "Fitting Suits" in the May issue.

It was a fun story and I enjoyed it. I, too, am frustrated and disgusted by some of the more blatant abuses of the legal system in our time. However, the story seemed to leave the impression that the government bureaucracy is ignorant of the existence of computers, which is totally untrue. I work at the Internal Revenue Service Center in Fresno, California, and I assure you that the enormous plant is centered around a mainframe computer and that the vast open work spaces are distinguished mainly by squadron upon squadron of computer work stations. Literally. The center has been computerized since it opened in the early seventies.

The difficulty is not in having computers but in getting funding to have new equipment, which would cut costs even further. At present it costs less than $2.00 to process the average tax return, and those on which optical character readers can be used average less than $0.01. Electronic filing is being introduced experimentally (I have filed my individual return electronically for the last two years) and other developments are on the way. As for the amount of work being done, well, the center has had more than one day in which it has done a billion dollars worth of business. While the bureaucracy is large, it boggles the mind to imagine how large it would have to be to do the work it now does without the use of computers. Furthermore, some 2,000 seasonal employees are hired a year; wages for all employees are 28 to 30% lower than for the same work on the economy; and those 2,000 seasonals help to lower the local unemployment (the economy is largely agricultural). As a further note, there are at least sixty billion dollars in taxes that are not collected each year, largely due to lack of manpower, that is to say, funding.

I repeat that I enjoyed the story, though I was saddened by poor Carter C. Carter's unfortunate demise. While Mr. Bova undoubtedly ignored government use of computers to heighten the fun and plausability of the story, I thought a letter concerning the true state of affairs might be useful and informative for your readers. I seem to remember an old story in the same vein by Isaac Asimov describing how a goose could really lay a golden egg. Entertaining reading.

JOHN C. HOBBS

Fresno, CA ■

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a calendar of analog upcoming events

18-20 January
THE BASH '91 and RETROSPECTIVE STAR TREK™ (Boston area Star Trek™ convention) at the Sheraton Tara, Braintree, Mass. Registration—$35 until 1 January, $40 at the door. Info: Bash '91, % Boston Star Trek Association, Box 266, Quincy MA 02269 or Retrospective, % Gail Abend & Joan Stanley, Box 95, Boston MA 02101.

25-27 January
IMMACULATE CONFUSION (Michigan SF conference) at Southfield Days Hotel, Southfield, Mich. Guest of Honor—Esther M. Friesner, Artist Guest of Honor—Robin Wood, Fan Guest of Honor—S.P. Somtow, TM—Wendy Counsil. Registration—$18 until 1 December 1990, $22 thereafter and at the door (payable to AASFA/ConFusion); include date of birth with registration. Info: ConFusion, Box 8284, Ann Arbor MI 48107 (include SASE).

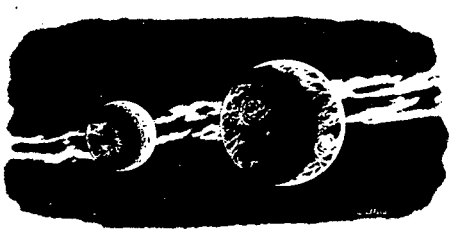
15-17 Feb
Boskone XXVIII (New England regional SF conference) at the Springfield Marriott and Sheraton Tara, Springfield, Mass. Guest of Honor—Mike Resnick, Official Artist (in memoriam)—Emsh (Ed Emshwiller), Special Guest—Brian Thomsen (Questar Books). Registration—$28 until 11 January 1991, $40 at the door. Info: Boskone XXVIII, Box G, MIT Branch, Cambridge MA 02139-0910.

29 August-2 September
CHICON V (49th World Science Fiction Convention) at Hyatt Regency, Chicago, Ill. Guest of Honor—Hal Clement; Artist Guest of Honor—Richard Powers; Editor Guest of Honor—Martin H. Greenberg; Fan Guest of Honor—Jon & Joni Stopa. Registration—$95 until 31 December 1990. Supporting—$20 at all times. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Chicon V, Box 8121, Columbus OH 43221-8121.

8-14 September
VOLGA-CON (International SF convention on the Volga). Sponsored by SF Club "The Winds of Time" and the Youth Association ATOM. Info: Volga-con, % Boris A. Zavgorodny, Volgograd-66, Poste restante, U.S.S.R. Telephones: 34-74-62, 34-74-64, 34-44-09, 34-86-56.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.



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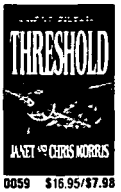

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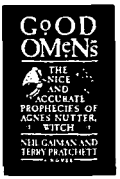

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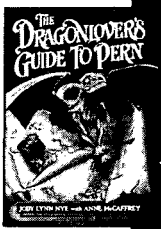

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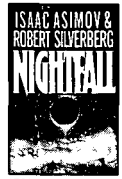

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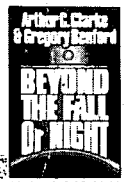

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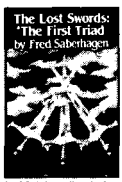

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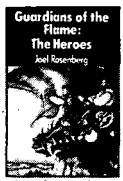

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